MARINE REVIEW

Entered at Cleveland Post Office as Second-class Mail Matter.

VOL. XXI. Published every Thursday at 418-19 Perry-Payne Bldg., by the Marine Review Pub. Co. CLEVELAND, O., APRIL 5, 1900. Subscription $2.00 a year. Foreign $3.50 a year. No. 14

AMONG LAKE BUILDERS.

AFFAIRS OF THE CONSOLIDATION — PROPOSED ESTABLISHMENT OF A NEW DRY DOCK PLANT AT BUFFALO — NOTES FROM THE DIFFERENT YARDS.

The American Ship Building Co. (consolidated lake ship yards) closes its books today (Thursday) for the payment of a third quarterly dividend of 1¾ per cent. on preferred stock. This is in accordance with the guarantee of 7 per cent. to the holders of preferred shares. Aside from the payment of these dividends, there is no information whatever given out regarding the finances of the big organization. When the consolidation was effected it was thought the stock would soon be listed on the New York exchange, and that this action would probably be accompanied by a statement of finances. The principals are evidently satisfied to make of their company a corporation closer in its affairs than other industrials that were more loudly heralded, and most of the stockholders seem to be of the opinion that they are right in this course. The stock, which sold in the beginning as high as $142 for the combined issue, preferred and common, took a decided slump a month or two ago when all the industrials went down, but it was claimed, and rightly so, that much of the loss was due to the action of F. W. Wheeler, who has been throwing onto the market for a long time past, in order to invest it in timber lands, stock which he received in payment for the West Bay City works that bore his name. Now it is said that practically all this stock has been bought up by a syndicate of principals in the consolidation. A dividend on the common stock with the close of the year in July next is talked of, but not by any of the officers of the organization, as on this score official information is as meager as in all other respects. It would seem, however, that the first financial statement of this organization should be of a very remarkable kind. There was no reason to doubt the statement that the company was first of all placed upon a very conservative financial footing. Its works have been crowded to the utmost from the outset, with most of its contracts for new vessels made at good figures. Expenses have been reduced in many respects over the combined expenses of the several companies that were taken into the consolidation, and the control of repair work, in which there has been most profit, has been such as to admit of prices being made as high as they could be placed without the danger of prompting competition. There is every prospect of all the building berths of the company at the different yards being filled as rapidly as the vessels now under way go into the water, and it would seem, therefore, that if this corporation, with its control of probably 90 per cent. of the ship building industry on the lakes, does not present a very attractive statement with the end of the year there is not much strength in similar consolidations that have been formed of late. The visit of President Brown, General Manager James C. Wallace and other officers of the company to Buffalo within the past few days undoubtedly means the ultimate extension of operations of the consolidation to that port. When the American Ship Building Co. was organized it was expected, almost up to the last moment, that the works of the Union Dry Dock Co. of Buffalo would be included in the consolidation. Negotiations for the purchase of this plant were carried on after the consolidation but they failed, and then the Buffalo Dry Dock Co., which purchased the Mills docks, and which is planning for enlargement of that plant, came into the field. Buffalo is the only port where large repairs to ships are required and where the consolidation is without a works for that purpose. President Brown has announced that his company is negotiating for a site for the construction of one and probably two dry docks at Buffalo. This is undoubtedly true, but it is probably true also that if these negotiations should lead to the purchase of the Union works, such a course would be more satisfactory to the officials of the consolidation than the establishment of a new dry dock plant. In any event it is more than probable that the big organization will have a dry dock plant in Buffalo before another season comes around. Officials of the company say they have yards enough for the construction of new vessels and that all they want at Buffalo is a dry dock plant. This fact, together with the expensive location of the Union works, is used as an argument against a high price being paid for that plant.

Of the large number of steel freighters building at the different works of the American Ship Building Co. around the lakes—there are some seventeen of them—none are more important than the steamers J. W. Edenborn and J. H. Elwood now nearing completion at West Bay City, where John T. McGinness, formerly of the Globe works, Cleveland, is in charge. These steamers are duplicates of the 8,000-tonners launched recently at the Lorain works and named John W. Gates and James J. Hill. All four of them, as well as two other steamers of about 3,000 tons capacity building at the Globe yard, Cleveland, are for the American Steamship Co. (American Steel & Wire interests), of which A. B. Wolvin of Duluth, is general manager. Engines will be placed in the two steamers at West Bay City while they are still on the stocks. The first of them will be launched May 1 and will leave the ship yard about fifteen days later. The second vessel will follow about a month later. All pumps on these steamers are of Blake manufacture, the air pumps and ballast pumps of cross-compound, simplex type. Feed pumps are also compound but of duplex kind.

Mr. D. E. Ford, who relinquished the management of the West Superior (Wis.) works of the American Ship Building Co. a few days ago, says he is considering several offers, but has not as yet decided upon a place. A mistake was made in the announcement that Mr. Thompson, who was in partnership with Capt. Alex. McDougall in a vessel agency at Duluth, was to succeed Mr. Ford at the West Superior yard. Mr. Ford's successor is Louis Williams, a young man who has been employed at the West Superior yard since it was opened several years ago. Mr. Thompson goes to St. Louis to assist Capt. McDougall in the establishment of the ship yard at that point, in which steel barges are to be built for Mississippi river trade and in which H. S. Potter and other St. Louis gentlemen are to be interested with Capt. McDougall. The new dry dock at the West Superior ship yard—largest on the great lakes—is practically completed. Some trouble has been experienced with leaks around the gate, but it is expected this will be remedied and the cofferdam in front of the dock dug away so as to admit of vessels being docked shortly after the opening of navigation. It is understood, of course, that although Mr. Williams is to be superintendent, the leading spirit in the Superior Ship Building Co. will be A. B. Wolvin, who is president of that organization.

Although the contracts have not as yet been closed, arrangements have been practically completed between Mr. A. B. Wolvin of Duluth, and the American Ship Building Co. for the construction of either four or six steel vessels of Canadian canal dimensions for service between Duluth and Montreal. The vessels will each carry about 75,000 bushels of wheat and will be built with engines amidships for ocean service, so that they may be engaged on salt water during the winter period. They are not to be delivered until late in the fall. The company for vessels are to be built is not yet named but it is understood that there will be quite a large number of people interested in it with Mr. Wolvin. Not all the details of the organization have as yet been worked out.

It is announced from Toledo that the steel steamer Harlem, completely rebuilt by the Craig Ship Building Co., is again practically ready for lake service. It is said that the cost of rebuilding was about $100,000, and considerable figuring has been done as to how the Thompson Towing & Wrecking Co. of Port Huron, will come out on this venture after paying for repairs in addition to wrecking expenses and the sum of $30,000 said to have been paid to the underwriters for the Harlem after she went ashore on Lake Superior in the fall of 1898. The total of these expenses will undoubtedly be large, but with the increase in values of vessel property of late the purchasers of the Harlem have undoubtedly profited by the chances they took in buying this wreck and they are deserving of all they may have made out of it.

A new side-wheel passenger steamer, now nearing completion at the works of the Collingwood Dry Dock Co., Collingwood, Ont., will take the place next season of the old steamer Carmona on the Canadian route between Windsor, Ont., and Sault Ste. Marie, of which W. J. Brown of Windsor is manager. The vessel will be named Pittsburg. Her hull is of white oak, 232 feet over all length and 45 feet beam. She will have stateroom accommodations for 225 passengers.

An 85-foot excursion boat which W. A. Salisbury is building at Winona, Minn., will be launched during the present month. The gasoline engines for the boat are being made by the Winona Manufacturing Co. Should the boat prove a success it is understood that an effort will be made to establish a plant for the manufacture of marine gasoline engines and gasoline launches under the name of Salisbury & Co.

Mr. Robert Wallace and Mr. James C. Wallace of the American Ship Building Co., are preparing for a trip to Europe. Mr. James Wallace, who is general manager of the American Ship Building Co., will visit the principal European ship yards.

A Chicago correspondent says that work on the hulls of three vessels under way at the Chicago Ship Building Co.'s plant is going ahead very rapidly. The steamer building for the Bessemer line is about three quarters completed, a barge for the Carnegie company about half done and the bottom worked up on the steamer that is to be built there for the Carnegie company.

Both house and senate have now passed the bill to construct a revenue cutter for St. Mary's river. It is expected that an appropriation will be secured in the sundry civil bill so as to admit of the vessel being built in time for service in the spring of 1901.

The Pearson Boat Construction Co. of Duluth is building a gasoline launch 52 feet in length for H. M. Alworth. Gasoline launches are also being built for Dr. W. H. Magie and E. W. Peake.

Capt. Joseph F. Smith of Grand Haven, Mich., has purchased the excursion steamer R. J. Gordon and is converting her into a freighter.

Reiboldt & Wolter of Sturgeon Bay have secured a contract from Mann Bros. of Milwaukee for the construction of a tug to be utilized in towing logs.

SHIP YARDS EXCELLING ALL RECORDS.

Reports for the first nine months of the fiscal year, filed with the bureau of navigation, treasury department, show that excluding unrigged vessels, 732 vessels of 196,148 gross tons have been built and officially numbered, compared with 632 vessels of 169,794 gross tons for the corresponding period of the previous fiscal year. The sail tonnage was 73,098 gross tons, compared with 55,035 gross tons for the previous period; steam tonnage, 123,050 gross tons, compared with 114,759 gross tons.

Our steam tonnage for the year will be almost one-tenth of that launched by Great Britain. On the seaboard the Comus, 4,838 gross tons, was the largest vessel launched. Seven other steamships over 3,500 tons and less than 5,000 tons were launched, all for the coasting trade, including two for the Porto Rican trade, restricted to American vessels by military order. Since that order was issued the means of communication between the United States and Porto Rico have been the best, most frequent and most regular in the island's history.

THE SHIPPING BILL.

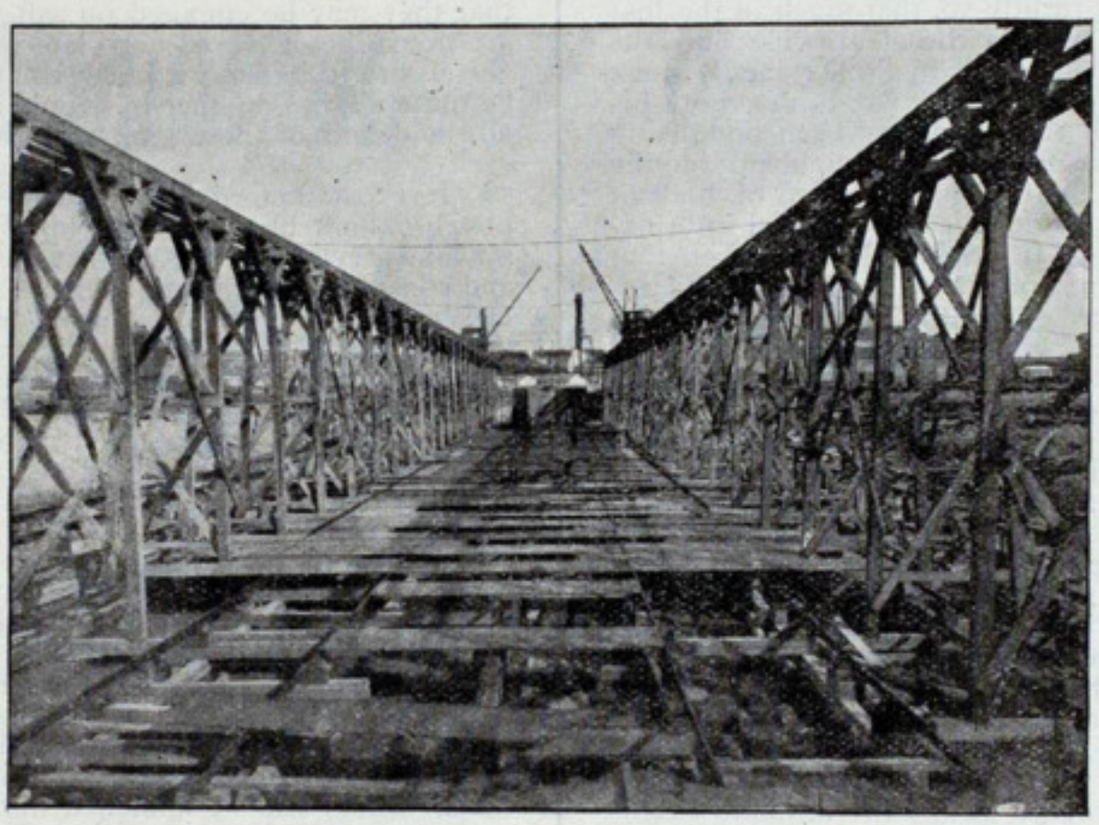
A STRONG REPORT IN ITS FAVOR FROM THE HOUSE COMMITTEE ON MERCHANT MARINE—CARDINAL POINTS OF THE MEASURE.

General Charles H. Grosvenor, chairman of the house committee on merchant marine, presented to the house on Monday of this week the amended shipping bill with a majority report upon it signed by every Republican member. The report is in part as follows:

"Our abundant natural resources and our industrious and increasing population make it of great value to increase the means of profitably disposing of our surplus productions, and, as our export trade is increased, so will be home consumption and employment. Our exporting competitors have for a long time been devoting themselves to increasing their export trade and getting possession of markets. Africa is an example of the methods pursued of partitioning territory or recognizing 'spheres of influence,' possibly eastern Asia being eventually destined to receive similar treatment. China may be left open to fair and equal competition with respect of trade with the United States, in which event one of the largest, if not the largest, fields for the trade and commerce of other nations will be open to those possessing the facilities for taking advantage of opportunity. The nation first in the field with its own productions and its own means of transportation will achieve the largest success, for which reason China must remove the barriers which now almost entirely exclude foreign intercourse. Other parts of the world in which our commerce holds so small a share would repay particular study."

The need of abundant establishments for the construction, docking and repairing of ships "an adequate navy" and "a great fleet of merchant vessels," all in readiness for an exigency, is asserted by the report to be "a self-evident proposition." On these grounds other nations have fortified themselves by increasing their sea power in all of the ways referred to, with the double object "of strengthening their facilities and power for carrying on foreign commerce." The report gives tables showing our sea-going sail and steam tonnage, in comparison with those of the principal maritime nations. In sail Great Britain has declined 45 per cent. since 1873-4; the United States has declined 40 per cent.; Norway has remained stationary; Italy has declined 59, Germany 40, France 64 and all other nations 26 per cent., the average for all being the same as that for the United States. In steam sea-going tonnage since 1873-4 the table shows there has everywhere been an increase, the following percentages showing its magnitude: Great Britain, 311; United States, 68; France, 200; Germany, 693; Spain, 275; Italy, 395; Holland, 399; Russia, 430; Norway, 1410, and all others, excepting Japan, 504. Japan's statistics only go back one decade, during which her increase has been 382 per cent. There was an average increase in the sea-going steam tonnage of all nations of 336 per cent. since 1873-4. The committee's analysis of this table says: "It appears, then, that with our great population, we stand at the very foot of the column."

ALGIERS FLOATING DRY DOCK.



A PHOTO SHOWING PROGRESS OF ITS CONSTRUCTION.

The floating dry dock which is now under construction at the Maryland Steel Co.'s works, Sparrow's Point, Md., for Algiers, La., is 36 per cent. completed and at the present rate of progress will be 50 per cent. completed before May 1. Ninety per cent. of the material has been received. All the bottom plates are in position and many of the athwartship bulkheads are erected. The riveting up was begun March 11 and soon fifteen pneumatic riveters will be busy. In the machine shop the centrifugal pumps are well advanced. The multiple punch, the only machine of its kind in this country, is reported to be doing wonderful work both as to output and extreme accuracy.

OUR LOSS IN THE LAST TWENTY-FIVE YEARS.

Our own share of our own foreign carrying, it is shown, has diminished from 26.1 per cent. to 8.9 per cent. during the last quarter of a century. References to the last report of the commissioner of navigation are made to indicate where tables may be found showing a list of the vessels now under foreign flags that are owned by American citizens, and the forty foreign vessels of 126,818 tons purchased by our government before the commencement of the Spanish war. The report states: "Had the war continued for another year, or had it occurred with any stronger power, the conditions of the United States in respect of the supply of auxiliary aids to our military operations would have been of the most serious character."

The American vessels permanently registered for foreign trade are shown to number 954 or 569,364 tons, and further details on this point are indicated as being in the commissioner of navigation's report, the pages in all such references being named. The report shows that during 1899 there were seventy-nine sail and steam vessels of 36,107 tons, built in the United States for foreign trade. Our average annual construction of ocean steamships (most of all of which were for our coastwise trade) for ten years past has been only 21,000 tons per year, compared with the British average construction of 968,000 tons per year.

The cost of ship building, it is stated, is in Great Britain at least 20, and probably averages 25, per cent. lower than in the United States, as shown by the evidence of those who appeared at the hearings in both the house and senate committees having the bill in charge. That people will buy where ships are built cheapest is obvious, and this accounts, says the committee, for the fact that Great Britain practically monopolizes the building of the world's ocean tonnage, notwithstanding our possession of the energy, enterprise, skill, capital, ship building material, harbors, ship yards and machinery for building the ocean trade ships. The cost of ship building and of operation, however, as will be shown later, does not comprehend all of the obstacles to our success as a maritime power, the aid given by other nations to their ships constituting an important factor.

A table is quoted that shows the actual wage expenses on five different steam ships of about the same size, under as many different flags, to be as follows per month: American vessel, $1,385; British vessel, $851.69; German vessel, $646.33; Dutch vessel, $553.62; Norwegian vessel, $510.72. The report then discusses the other policies that have been suggested for the upbuilding of the American merchant marine and the reasons for their rejection in comprehensive and conclusive detail.

The hostility of the people of other nations to any policy having in view the displacement of foreign with American ships in our foreign trade is adverted to and the selfish reasons therefor shown. "The principle of the bill advocated by the committee," says the report, "is unique. It is that our export trade shall be open on the same terms, so far as assisted by the policy, and the money of the United States is concerned, to every one of our citizens who may choose to engage in it, and upon terms of equality to all, according to service rendered. The application of this broad principle to our present needs, it is hoped and expected, will in due time give us a vastly increased merchant marine and a vastly increased sale in old and new markets of our products, as well as an American postal service to every port to which the vessels receiving compensation go; and it will also (most important to our national honor and safety) give us a great fleet of vessels auxiliary to our navy and indispensable to military operations abroad."

THE SUBSIDIES ARE NOT EXTRAVAGANT.

Immediately following the detailed summary of each provision of the bill the question of whether the compensation is too liberal is considered, and in which connection it is shown that the aids given their merchant ships by foreign governments during the last year for which the official data were available are as follows:

Great Britain	$ 5,851,525
Germany	*1,894,620
France	7,632,242
Italy	2,185,266
Russia	1,371,187
Austria	1,724,249
Spain	1,629,927
Portugal	63,300
Netherlands	259,971
Norway	136,948
Sweden	31,844
Denmark	82,455
Japan	3,492,107
Total	$26,355,641

*Besides land transportation aid.

This is as against a total of similar aid by the United States of only $998,211, which latter is below the average by $300,000 or $400,000, due to the ships receiving such aid being employed by the government during our war with Spain. Special reference is made to the American line, and its owners praised for their courage and patriotism in running their ships under the American flag at such a great loss each year. Cardinal purposes of the bill are summed up as follows:

1. To aid in a real practical way—and no doubt, under existing conditions, the only possible way—in bringing, to the greatest extent possible, our own foreign trade back into our own hands, and thus saving to our country certainly more than $100,000,000 transportation money annually, which now goes to increase the wealth of other nations.

2. To greatly increase the exportation and sale of all kinds of our superabundant productions, and especially in the vast regions of Eastern Asia, evidently very soon to be opened to the trade of the world. This is a trade that the nation best prepared to engage in will necessarily get the greater proportion of by its own ships under its own flag and with its own postal facilities and its own commercial establishment for the disposal of its productions.

3. To bring into existence at the earliest possible time a great American fleet of merchant vessels, built in our own country, with our own material and by our own labor, as a most necessary means of national aid and national safety in times of international war, or other disturbances, the probability of which is unhappily not small, even now.

4. To increase the number of our citizens who will be educated in seafaring work, and who will thus have the skill and be better able to defend the honor and interests of our country on the seas, however suddenly the occasion may happen.

5. The bill, we think, will, if the proposed compensation is large enough, accomplish these great and important purposes.

Gen. Grosvenor's report concludes: "It will, of course, take a considerable time to reach the desired end, but the sooner the policy is entered upon the sooner and easier will be its accomplishment. The means proposed are open to the capital, the enterprise and the skill of all our citizens alike, and on equal terms. There is no ground for any form of monopoly. There is absolute safety to the treasury in the fact that no payment can be made until in each and for each voyage the work is actually performed. As we have before stated, it is certain that no vessel —great or small, fast or slow in the list—can afford to make a single voyage without also having a large commercial income from the same voyage and in doing which commercial business she is fulfilling one of the great purposes of the bill. In view of the foregoing considerations we earnestly recommend the speedy passage of the bill with the amendments reported in connection with it."

FITTING OUT OF THE TRANSPORT SUMNER.

The house spent one entire afternoon discussing the furnishing of the transport Sumner last week. It was represented that no ocean liner, no yacht of a millionaire was so lavishly fitted out and that enough money had been spent on her to equip a dozen ordinary boats. The luxurious and costly furnishings extended even to the simplest articles. A device for boiling eggs cost $50 and the plate glass mirrors through which the officers surveyed themselves cost $1,500 each. The rugs were the most expensive that ever came out of Persia and the eye was greeted wherever it turned with magnificence most regal. Wherefore the representatives —particularly those from the agricultural districts—grew exceeding wroth and demanded an investigation. It was even proposed and a bill introduced to transfer the transport service from the war to the navy department.

Meanwhile the quartermaster general's office, which has the transport service in charge, was fuming and fretting at various inaccuracies in the account of the Sumner's furnishings and transmitted the following statement to the house:

1. The cost of the repairs to the transport Sumner at Erie basin, New York city, was not $8,000, but was $1,945.

2. The tumblers and water bottles in the staterooms were included in a sum total bid for all crockery, but can be bought at retail for 39 cents and $1.25 respectively, the cost being much less of course purchased in the lot.

3. The linen on board is of good quality, but is not the best, the cost of the same being as follows: Tablecloths, 87½ cents a yard; napkins, 22 cents each; sheets, 47½ cents each; pillows, 14 cents each, and pillow slips, 14½ cents each.

4. The glass covers for the front doors of the staterooms cost 50 cents apiece, and is the ordinary frosted glass used in doors of such character.

5. The tables in the dining room were made by the workmen at the Norfolk navy yard, and the exact cost is not known.

6. The chairs are the standard chairs used in all ocean-going steamers and cost $20 instead of $15. In this connection it would be advisable to call attention to the fact that all ships carrying passengers are fitted up with mahogany, simply because it stands the sea air better than any other woods; and while the original outlay is a little greater, it is the cheapest in the end, as it takes a great deal less labor to keep it polished and lasts much longer than other woods.

7. There are three mirrors in the sideboard, the total cost of the three being $12.50, instead of $1,500. The large mirror at the head of the stairway cost $35.

8. There is no silverware on board the ship. It is simply plated ware, and the total silver plate on board the ship costs $1,298.99, instead of $8,000, as stated, for the silverware on the sideboard alone.

9. The carpets are ordinary body Brussels carpets, and cost $1.10 per yard. The rugs are the ordinary Smyrna rugs, and average $10 each.

10. The entire plumbing aboard the ship, including everything, bath rooms, bath tubs, shower baths, washstands, all piping, and all fixtures for officers, soldiers and crew, cost but $12,983.81. The average cost per bath room is $354.96. Shower baths cost $5 each. The washstands in the corner of the staterooms cost $18. Nickel-plated brass is found to be the cheapest thing to use in this work, as it wears much better and costs less in labor to keep it in proper condition. The bath tubs cost, approximately, $125 each, instead of $200.

11. The automatic egg-boiler cost $60, and with the large amount of cooking which is necessary to be done for the different messes is an essential and is not an absolutely or relatively costly article.

12. The flooring of all bath rooms, shower baths, butcher shops, kitchens, and other places which are continually covered with water, are of tile or a composition of cement, and cost 60 cents per square foot. You can readily see that this is the only kind of material that should be used in such places, as wood would rot and iron would rust.

13. Bunks are substituted instead of hammocks as used in the navy, as they permit of carrying more men, and they take up less space and are more comfortable. These bunks cost $6.50 per bed; the cost of the navy hammock, with pads and one-half standee, which would be necessary, averages $6.63 per man.

BIDS FOR A LIGHTSHIP.

Bids were reopened by the light-house board March 30 for the construction of light-ship No. 74 for the Cape Elizabeth station. The original appropriation for this vessel was $75,000 and therefore the specifications called for a wooden vessel. Later an additional appropriation was granted as none of the first set of bids was within the original estimate. Following is the new set of bids: Spedden Ship Building Co., Baltimore, $82,900; Arthur D. Storey, Essex, Mass., $78,238; Bath Iron Works of Bath, Me., $78,450; Petersburg Iron Works, Petersburg, Va., $77,837.

This vessel has hitherto been described in the Review. She will be 118 feet between perpendiculars, 128 feet over all, 28 feet 6 inches beam on frames, and 14.7 feet depth of hold. The ship will be sheathed with copper to 2 feet above the water line. The engines will be compound with cylinders of 15 and 30 inches diameter and 22 inches stroke, driving one propeller 7 feet 9 inches in diameter. Two boilers of the gunboat type will be constructed for a pressure of 110 pounds. Everything about the boat will be of American manufacture.

THE LATE GEORGE H. BERTRAM, M. P.

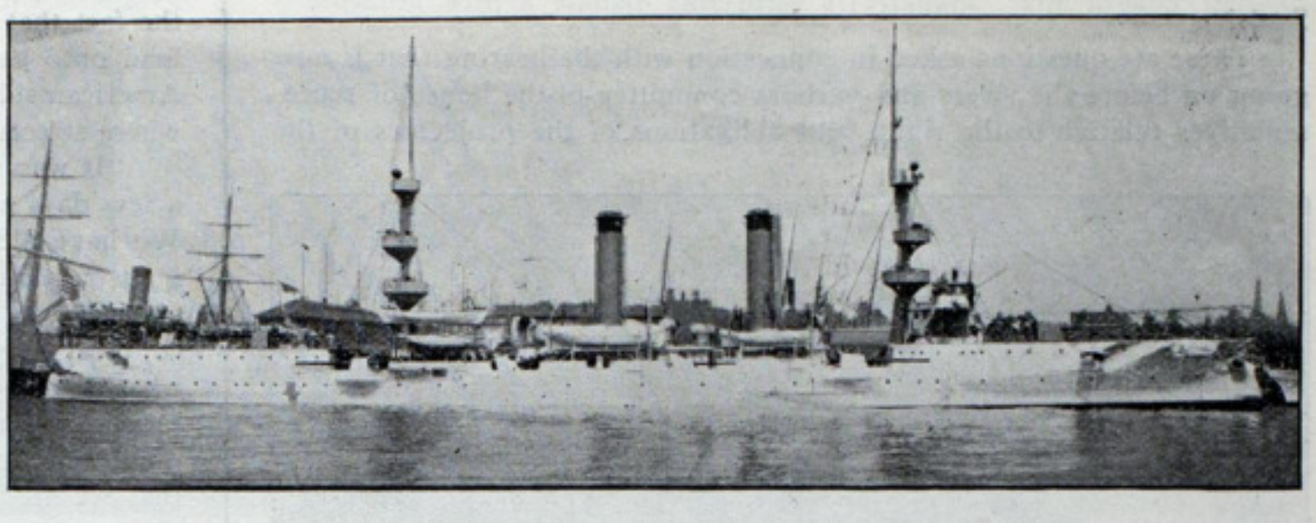
George H. Bertram, M. P., well-known merchant and head of the Bertram Engine Works Co., Toronto, who recently died in his fifty-third year, was one of the most energetic business men which Canada has produced. Long before he was elected to parliament for the Dominion he was consulted by the government in revising the tariff on iron and steel. He had been a resident of Canada for thirty-five years. By his enterprise the Doty Engine Works, taken over by the company he formed, was changed from a failure to a marked success. Out of it was developed the fine ship building industry that now flourishes in the yards of the Bertram company.

ELEVEN MILLIONS IN NEW SHIPS.

The present program of the Hamburg-American line, as briefly outlined in the Review last week, is an enormous one. At the close of last year the Hamburg company had seventy-six ocean-going steamers on its list. Of these twenty-three are large, practically new twin-screw passenger craft, a larger number than any other line possesses. The total tonnage of the seventy-six ships is 418,812.

"Our company now has," said General Agent Emil L. Boas, "twenty-two new steamers on the stocks or contracted for. These ships will add 150,000 tons to the company's fleet and will bring the total number of steamers owned by this company nearly to the hundred mark. The majority of the new ships are to be twin-screw vessels. Included in the fleet is the Deutschland for the express service and the Kaiutschau, the latter of 10,200 tons, for the mail service. All of the new ships are not, of course, intended for the trans-Atlantic trade, but a good portion are to run from the River Elbe to New York, Philadelphia and Baltimore."

Included in the list of vessels is the new steamer Prinzessin Victoria Louise, which is of 4,000 tons. This vessel is to leave Hamburg Sept. 25 for a trip around the world, the first excursion of its kind ever taken by any company. With the exception of the Deutschland, Kaiutschau, Stiria, Sambia and Segovia, none of the twenty-two new steamers have been named. The aggregate cost of the twenty-two steamers will be $11,000,000.



NEW UNITED STATES CRUISER ALBANY.

The cruiser Albany, a description of which was published in the Review two weeks ago, is now at Newcastle-on-Tyne and will be placed in commission on May 1. She will then sail for New York under command of Capt. Joseph C. Craig.

DESIGN FOR A NOVEL BOAT.

Frequently the bureau of construction and repair is besieged by inventors who have new designs of boats which they desire to exploit. The latest is one which contemplates the construction of an electrical boat of 300 tons displacement and a speed of 44 knots. Nothing will be done with the proposition, which in language is as follows:

"In order to make a demonstration of the efficiency of our system at a less expenditure of money than would be the case in constructing a large ship, the size of vessel we propose to build has been arrived at from the most exhaustive investigation. The dimensions of the vessel and its machinery will be as follows: Length, 220 feet; beam, 21 feet; depth, 12 feet; draught, 5 feet; displacement, 300 tons; horse power, 20,000; speed, 44 knots or 50 statute miles; bunker capacity sufficient to run 4,000 miles; additional load carried for each foot of draught in excess of 5 feet, 82 tons. Maximum load at 7 feet draught, 464 tons. The machinery will consist of the following: There will be twelve boilers, giving a total heating surface of 25,000 square feet and 600 square feet of grate surface. Total weight of boilers and water fittings, 72½ tons; four sets turbine engines, fittings, etc., 26¾ tons; dynamos and motors and electrical equipment, 82¾ tons; weight of hull and fittings, special nickel steel, 34¼ tons; load on trial, coal stores, furnishings, supplies and crew, 68 tons; shafts, propellers and fittings, 15¾ tons; total weight, 300 tons.

FISHERIES OF LAKE ERIE.

Very few persons have any idea of the extent of the fish business of Lake Erie. A bulletin just issued by the United States commission of fish and fisheries shows that the total number of men employed in the business on this lake alone is 3,728, and that the total value of shore property and cash capital invested is $2,719,654. Figures dealing with the industry throughout the lake region would, of course, be many times greater than those just quoted. The yield on Lake Erie was 58,393,364 pounds, valued at $1,150,890. Following are the figures covering the different kinds of fish and the values: Black bass 133,746 pounds, value $9,866; blue pike 4,544,786 pounds, value $139,301; carp 3,633,697 pounds, value $51,456; catfish 1,002,704 pounds, value $30,451; crappie 60,000 pounds, value $1,800; grass pike 19,426 pounds, value $1,227; herring 33,427,797 pounds, value $431,037; mooneye 43,836 pounds, value $867; perch 3,315,496 pounds, value $52,625; rock bass 5,296 pounds, value $91; sauger 3,026,565 pounds, value $75,313; sheepshead 1,147,122 pounds, value $7,651; sturgeon 789,402 pounds, value $53,392; sucker 1,568,734 pounds, value $18,077; sunfish 175,440 pounds, value $4,362; trout 32,024 pounds, value $1,736; wall-eyed pike 1,735,214 pounds, value $86,455; white bass 1,596,524 pounds, value $30,603; whitefish 2,066,314 pounds, value $152,009; other fish 1,048 pounds, value $75; frogs 982 pounds, value $172; turtles 67,211 pounds, value $2,324; totals 58,393,364, valued at $1,150,890.

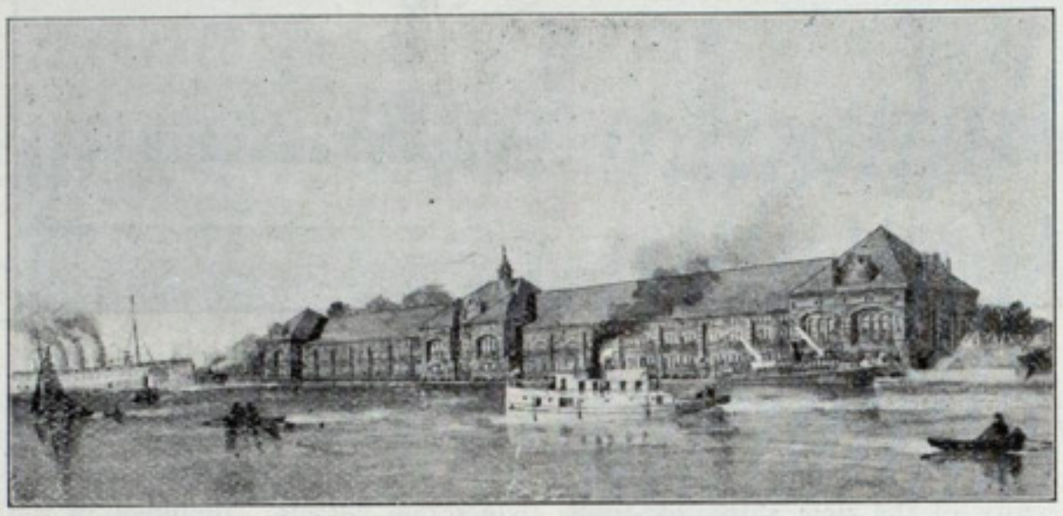
Mr. W. B. Cowles of Cleveland has been conferring with the navy department during the present week regarding the use of his "long arm" system of watertight doors and hatches. The system, described in the recent naval edition of the Review, is one whereby an officer on deck, or at some central station, is able to instantly close all the doors in watertight compartments or bulkheads throughout the ship. The system was first practically tested on the protected cruiser Chicago. Since that time it has been placed on some twenty or thirty ships and it is said it will be employed on all of the new ships of the navy.

GREATEST WATER POWER DEVELOPMENT IN THE WORLD.

IMMENSE OPERATIONS OF FRANCIS J. CLERGUE, ACTING FOR PHILADELPHIA CAPITALISTS, AT THE SAULT—DEVELOPMENT OF MINERAL AND TIMBER LANDS—A GREAT PULP INDUSTRY.

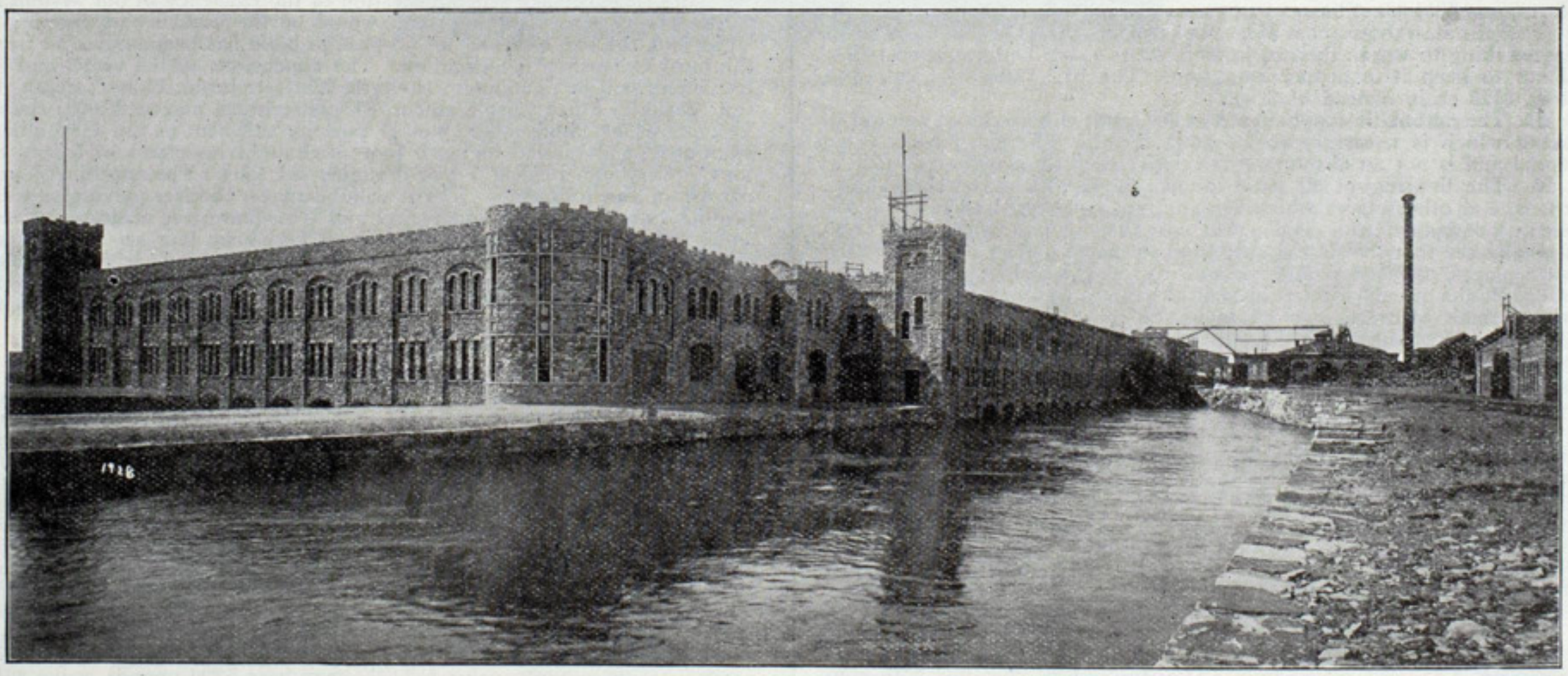
Who is Francis J. Clergue? How extensive is the water power development projected by Philadelphia and other eastern capitalists under his direction at the rapids of the St. Mary's river? Is his financial support of a substantial kind, and what have been his business methods in the several very large industrial enterprises already under way at the Sault?

These are questions asked in connection with the hearing that is now going on before the rivers and harbors committee of the house of representatives relative to the rights and obligations of the projectors of the



POWER HOUSE PLANNED FOR SAULT WATER POWER DEVELOPMENT.

Sault water power enterprise. Mr. Clergue was introduced to the vessel interests through the active part which he took in the first meeting on this subject at Washington. He discussed engineering problems, big industrial undertakings and even the legal questions brought before the committee. He was evidently the leading spirit in a mammoth enterprise; a great work about which little was definitely known, even by the vessel men trading to Lake Superior. Aside, therefore, from the question of the effect of this water power development on the navigation interests, there was much in it to prove of interest to readers of the Review. Such is solely the object of this article dealing with an investigation of what is being done at the Sault. A representative of the Review found under



PULP MILLS AT SAULT STE. MARIE, ONT., OPERATED BY ST. MARY'S RIVER WATER POWER.

way there not only a canal of greater magnitude than any similar work of its kind in the world, but an actual development of the power on the Canadian side in pulp mills that are turning out about 150 tons of pulp a day. But these are not large projects compared with what Mr. Clergue and the Philadelphia capitalists who are supporting him have planned for the Sault. From iron mines a few miles up the north shore of Lake Superior, near Michipicoten, he will certainly move iron ore in large quantities, very probably half a million tons during the coming season, and a much larger project, but one that will require several years of labor, is the construction of a railway through some 400 miles of timber and mineral lands in the Algoma district of Canada to Hudson bay.

Francis J. Clergue is certainly a man of enormous capacity and resources. He is probably not more than thirty-eight or forty years of age, originally from Maine and trained for the practice of law, but brought into big industrial affairs through peculiar qualifications as an organizer and master of the details of such undertakings. From the outset he has enjoyed the confidence of the Canadian government, from the premier down, the people of the Sault say, and they add that the reason of it is the fact that he has paid cash in all his purchases, has had no bonds to load onto the banks of Canada and has asked for nothing more on the American side of the river than the construction of a few bridges at points where streets cross the great canal that he is building.

"It was not our intention," Mr. Clergue said when seen at the Sault a few days ago, "to encourage public reference to any of our projects. We have $18,000,000 to spend in the next five years in development of industries on both sides of the river, but we would have had nothing in particular to gain by announcing that such was the case. Now we are anxious, however, that the vessel owners especially should know just what we are doing, as we are satisfied that with a knowlegde of the scope of our undertakings they will understand that what is their interest is ours, and we have never had any doubt of our ability to prove to them that we are as much interested as they are in providing the necessary compensating works in the rapids of the St. Mary's river." But this subject was not dwelt upon at length for reasons already noted.

IRON ORE TO BE SHIPPED THIS SEASON

Mr. Clergue spoke freely of his Helen iron mines near Michipicoten. Pickands, Mather & Co. of Cleveland, own property adjoining the Helen mines. The ore is a hard red hematite, in every way similar, it is claimed, to the Vermillion ores of Minnesota, which are handled by Pickands, Mather & Co. "We have enough of this ore in sight on a hill side," Mr. Clergue said, "to put millions of tons on the market and it will be done very rapidly. I have agents in England now arranging for the purchase of eight steamers, four of which will arrive at Montreal about the opening of lake navigation and will be brought up the St. Lawrence canals. Four others will come over soon after the opening of navigation, and we have arranged also for the construction of eight barges in England to tow with these steamers. The barges will not, however, be ready for service until 1901. One of the first of the steamers coming over is to bring a cargo of cement to be used on our works here, and both barges and steamers will be sent to the Atlantic for service in the winter. Of course the steamers of tramp type which we are purchasing will be of deep draught and will not carry a very large cargo, even of pulp, through the canals when being transferred to the coast, but on 18½ feet draught they will each carry 2,500 tons of ore on the lakes, and this means 10,000 tons a trip for the fleet. We were driven to purchase them in England on account of our inability to secure almost any kind of vessels for immediate service on the lakes. They will be of Canadian register, but this will not, of course, prevent their trading between Canadian and American ports."

This ore project was not taken up until May last, and yet Mr. Clergue insists that he will certainly ship to Lake Erie ports no less than half a million tons during the coming season. A railroad of 12 miles length from Michipicoten—a beautiful harbor—to the ore property is completed excepting a short rock section, and the substructure of the ore dock at Michipicoten was put in last fall. A force of workmen will leave the Sault as soon as the ice will permit (a vessel was left above the locks for that purpose) to complete the ore dock. "We have contracted our mining," Mr. Clergue says, "with Powell & Mitchell of Marquette, Mich., who undertake to mine, crush and deliver into our cars at the rate of 1,000 tons a day by May 15, 2,000 tons a day by June 15, and 3,000 tons a day by July 15. Crushers are already at the mines." This ore development is under the immediate direction of E. V. Clergue, brother of the

general manager of the different interests here referred to. The ore is to be blasted from a hillside and the low cost of mining in this operation, together with the very short rail haul and the fact that the water haul to Lake Erie ports is no greater than that from Marquette are all points held up in its favor. Of course it is expected that the duty of 40 cents a ton on this ore coming into the United States will be paid.

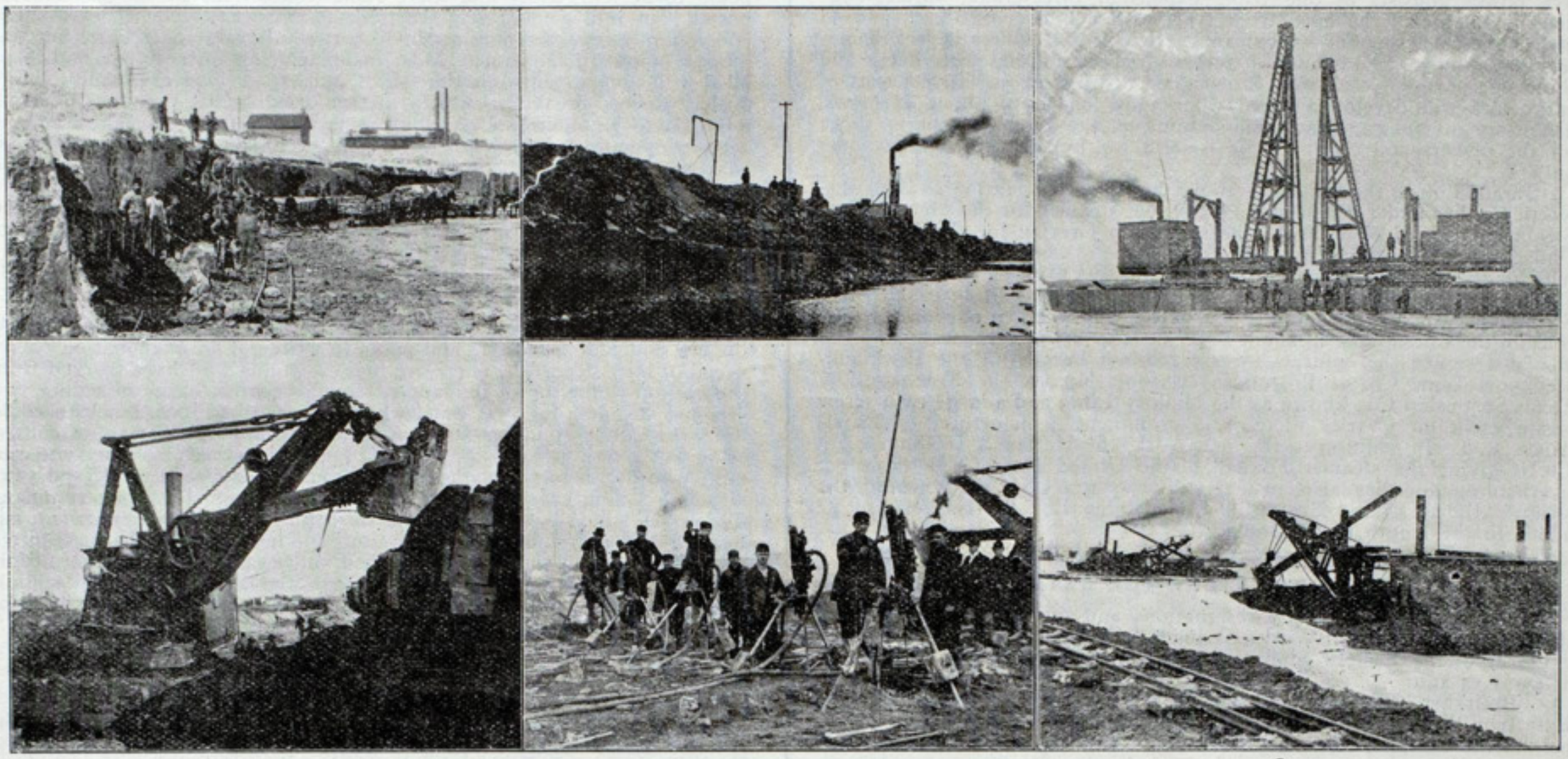
PULP INDUSTRY AND OTHER ENTERPRISES ON THE CANADIAN SIDE.

One of the half-tone illustrations shows the pulp mills on the Canadian side of the river at Sault Ste. Marie, Ont. This is the fully developed enterprise that has acted as a beginning for the large investment of capital that is going into water power on both sides of the river. Around these works the Lake Superior Power Co. (Michigan Lake Superior Power Co. is the name of the principal corporation on the American side) owns 3,000 acres of land—the site of the Hudson Bay Co.'s operations years ago. Francis J. Clergue lives in the block house (remodeled and modernized, of course), that was used as a headquarters by the Hudson Bay Co., and very close to it is the spot, still clearly outlined, on which was located the first lock built for the transfer of vessels to and from Lake Superior. It is on this large tract of land that the terminals of the proposed Algoma Central Railway, for the development of mineral and timber properties, are to be built. Here, too, Mr. Clergue says he will have mills of very large proportions for the manufacture of nickel steel of the finest quality, which it is claimed can be produced at this point cheaper than anywhere else in the world, on account of the close proximity of the famous Sudbury ores. All this land is being made ready for the erection of buildings, and the stone used is the native sandstone, most of it taken from the rock cut in the big canal on the American side. A new machine shop going up close to the pulp mills shown in the illustration is costing with its equipment of tools about $125,000, and next to this new building is a large sulphate fiber works, well along towards completion. Locomotives with trains of cars, all owned by the water power interests, are continually passing over the international bridge with great loads of stone and other material used in all manner of construction work. A laboratory, which has been in operation for some time past, is more complete than any private works of its kind in the United States. Several chemists are employed constantly on samples of minerals that are coming in every day, not only from exploring parties in the employ of the water power interests but also from other sources in all parts of the surrounding country.

The pulp mills are now employed on an order from France that will take up the entire capacity for the next two months. It is said that the large quantity of pulp involved in this order—capacity of the mills is 125 to 150 tons a day—goes into paper for one publication that is to be issued in connection with the Paris exposition. No ground wood pulp establishment in America is anything near as large as this one, and with great abundance of spruce close at hand for generations to come, and water from Lake Superior as clear as will be found the world over, there is no pulp proposition more economic. It is under the immediate direction of B. J. Clergue, another brother, who is assistant manager of the water power interests, and who has seen training in all branches of the pulp industry. With the high prices now prevailing for pulp these mills are undoubtedly very profitable. They have been engaged on Japanese and other foreign orders almost entirely of late. Everything about them is, of course, worked on the principle that the water never stops—they go night and day. About 14,000 horse power is in use constantly in these mills.

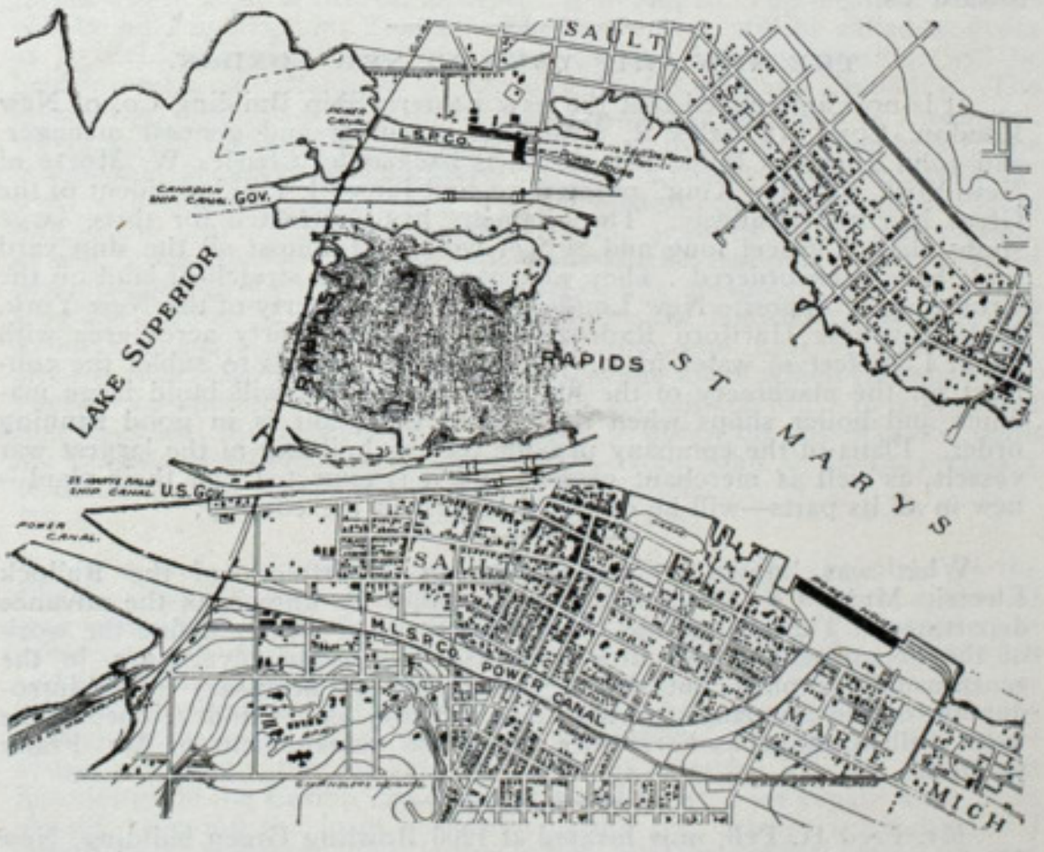
MAMMOTH WATER POWER DEVELOPMENT ON AMERICAN SIDE OF RIVER.

It is quite probable that the United States government has never had in its river and harbor works a project of greater magnitude than the canal and power house for water power development that is being hurried to completion through the town of Sault Ste. Marie, Mich., on the American side of the river. It is the greatest hydraulic development ever undertaken in the world—a canal two miles long, carrying 30,000 cubic feet of water per second (nearly half to flow from Lake Superior) and furnishing 40,000 horse power. Half of this power is to be used, under a contract already entered into, by the Union Carbide Co., well known in connection with a similar enterprise at Niagara. The greater part or probably all of the balance of the power will be used by the American Alkali Co., a corporation formed for the special purpose of taking advantage of this hydraulic development in connection with minerals that are found in great abundance around the Sault. The scene all along this stretch of two miles of canal, about 200 or more feet wide and going down to about 25 feet depth in most places is certainly one of great activity. It involves the use of some twenty locomotives with long trains of dump cars and six steam shovels of the largest type, as well as great numbers of rock drills, a large air compressor plant, etc. Great masses of concrete blocks, piles for foundation work and all kinds of timber and other material are to be found all along the line of the work.



Excavating in Power House Pit. Channeled Rock, Canal Side. Driving Sheet Piles for Cofferdam.
Excavating Rock by Steam Shovel. Drills for Work in Rock Section. Dredging in Power House Pit.

VIEWS ILLUSTRATING PROGRESS OF POWER CANAL CONSTRUCTION AT SAULT STE. MARIE, MICH.



MAP SHOWING POWER CANALS AND SHIP CANALS ON BOTH SIDES OF THE ST. MARY'S RIVER RAPIDS.

Contracts for the large works on the American side were let in Sept. 1898. Full one-third of the work is now done. The general scope for which this development is planned to secure 40,000 effective electric horse-power from dynamos operated by turbines. Hydraulic power is to

(Continued on page 18.)

AT THE HARLAN & HOLLINGSWORTH WORKS.

The Harlan & Hollingsworth Co., Wilmington, Del., launched the steamer Mannahata last Saturday morning. She is one of the two vessels which this company is building for the New York & Baltimore Transportation line of Philadelphia, of which Mr. F. S. Groves is general manager. The first, the Chesapeake, will be delivered in a week or two. These vessels are intended to run outside between New York and Baltimore on what is familiarly known as the Shriver line. The Mannahata was christened by Miss Amy Clare Hutton, granddaughter of Mr. Walter Shriver, of New York. Dimensions of the Mannahata are as follows: Length over all, 219 feet; length between perpendiculars, 205 feet; beam, molded, 32 feet; depth to upper deck at center, 23 feet 3 inches. The motive power consists of one triple expansion three-crank, surface-condensing engine of the open front type, with cylinders of 18, 28 and 45 inches diameter, supplied with steam by two Scotch boilers 11 feet diameter, 10 feet long. She is built of steel throughout and has three decks and three side ports on each side; is designed to carry about 900 net tons of cargo and will develop a speed when fully loaded of about 12 knots. There are no passenger accommodations on the vessel excepting those for the officers and crew, as she is built for freight carrying purposes only.

In addition to the freighters above described the Harlan & Hollingsworth Co. has under construction a 280-foot steamer for the Metropolitan Steamship Co. of New York; the steamship Grecian for the Boston & Philadelphia Steamship Co., which will leave in about two weeks; three tugs for the Pennsylvania Railroad Co., and two torpedo boat destroyers. Hopkins and Hull, for the government. The torpedo boat destroyer Stringham, which is now almost completed, will be taken out for her final trial on the Chesapeake in about a week. The Wilmington company has also just signed the contract for six 200-foot barges for the Rockland-Rockport Lime Co. of Boston; a 400-foot ship for the New York & Texas Steamship Co., known as the Mallory Line; and a large twin-screw steam yacht for Charles Fletcher, a prominent manufacturer of Providence, R. I. In addition to this new work, the Harlan & Hollingsworth Co. is giving the steamer Foxhall of the United Fruit Co. a thorough overhauling and has also just signed a contract for lengthening the steamer Indian of the Boston & Philadelphia Co. Forty feet will be added to the length of the Indian.

NOT TRYING TO INJURE THE BATH WORKS.

In speaking of the many resignations and the changes necessitated thereby at the Bath Iron Works, William A. Fairburn, naval architect and engineer of the Eastern Ship Building Co., New London, Conn., said a few days ago:

"Both Mr. Hanscom and myself resigned our positions with the Bath Iron Works and left Bath with the very best of feeling. The principals of the company were of course very sorry to have us go and they expressed themselves quite strongly accordingly. We are not endeavoring to take the best men from the Bath works. All whom we have as yet engaged have applied to us for positions. The Bath Iron Works will not be very seriously affected by our withdrawal. They will be embarrassed for a time, but they have a fine compact plant of medium size, and the works are in flourishing condition. They have all the work that they can attend to at present, and they will before long fill our places and obtain a good technical and practical personnel. Only about 10 per cent. of the men we shall employ will be men who have worked for the Bath Iron Works. We are about to build ships that the Bath works could not handle, and it is doubtful whether we shall ever be brought into direct competition with them. The Bath Iron Works has our very best wishes. We heartily wish the company success and prosperity and we know that the head officials of the concern have the same kind feelings toward us."

THE NEW SHIP YARD AT NEW LONDON.

It is now announced that the new Eastern Ship Building Co. of New London, Conn. (Charles R. Hanscom president and general manager, and John Sherman Hoyt, treasurer), is backed by Charles W. Morse of New York, the "Ice King" millionaire, and James J. Hill, president of the Great Northern Railway. The company has contracted for three large shops about 250 feet long and 80 feet wide, and almost all the ship yard tools have been ordered. They will own or lease a stretch of land on the Groton shore opposite New London—now the property of the New York, New Haven & Hartford Railroad Co.—of about thirty acres area with about 1,500 feet of water front. The company intends to sublet the contract for the machinery of the first two vessels but will build large machine and boiler shops when the rest of the plant is in good running order. Plans of the company provide for the building of the largest war vessels, as well as merchant vessels, and it is expected that their plant—new in all its parts—will be one of the finest in the country.

What was known as the advertising department of the Bullock Electric Mnfg. Co., Cincinnati, will hereafter be known as the advance department. The change has been made to more clearly define the work of the department, which now comprises not alone advertising, in the sense usually implied, but also the advance work necessary in the introduction of the company's product into territory as yet undeveloped. The work will continue as heretofore under the management of Mr. Frank G. Bolles.

Mr. Fred H. Pell, now located at 1206 Bowling Green building, New York, announces in a circular to the marine trade that he has resigned the position of general agent with the Marine Manufacturing & Supply Co. and has begun business on his own account, dealing in pumps, capstans, gipsy windlasses, winches and everything that enters into marine supplies.

Willard A. Smith, United States director of transportation and engineering at the Paris exposition, has bought the old canal boat which was built for Lafayette upon the occasion of his second visit to the United States. Lafayette and his party were taken from Albany to Buffalo on it. The relic will be taken to Paris.

BUYERS OF IRON AND STEEL ARE WAITING.

A waiting disposition among buyers in iron and steel lines is evidently a source of some anxiety among the manufacturers, notwithstanding the orders at high prices upon which the latter will be engaged for a long time to come. The anxiety relates to prices for the latter part of the year. The manufacturers insist that there will be no need of any great change from present conditions if the coming month is tided over without a break in the market. The situation is explained in the following summary of the situation from the Iron Age:

"The iron market is disappointingly quiet. New business is not developing as it should do at this season. We are now on the threshold of the second quarter and the stimulating influence of spring trade should begin to be felt. Here and there some transactions of fair size are reported, but in a general way the trade is extremely dull. The situation is commonly regarded as a deadlock between buyers and sellers, but this is more apparent than real. Most manufacturing interests are well supplied with work taken some time since, and are pushing production vigorously. Record-breaking outputs are reported. This does not indicate unsatisfactory conditions. As long as the mills and furnaces are able to keep in operation at high pressure, and the great producers manifest no anxiety as to the future, there is little warrant for taking a gloomy view of the situation. Nevertheless, it would be much more encouraging to find buyers disposed to anticipate their wants a little more freely than they are now doing. As it is, those who need material are buying from hand to mouth waiting and perhaps hoping for a slump in prices."

AGAINST WRITTEN EXAMINATIONS.

Editor Marine Review:—Ship masters of the great lakes should oppose the law compelling masters and pilots to write out an examination on renewal of their licenses. There are many captains who have worked from the bottom to the top of the ladder, having been in charge of sailing vessels and steamers for years, and who never had bad luck, but who could not write out as good an examination as a schoolboy; I mean, of course, as far as the writing and phraseology of it is concerned. I know some captains who began to sail at the ages of fourteen or fifteen years, and who, although sailing every year of their lives after they were given command of a vessel, have never had a serious mishap of any kind. They write a fair hand, figure up freights and crews' time, and in fact do all that is required aboard a ship, but must they be barred out because they had the misfortune of spending nearly their whole lives on the lakes instead of at school? I hope something will be done so that captains who have pulled bells for years without a mishap will not be forced to go back to the wheel.

Marysville, Mich., April 2, 1900. T. A. ELLERY.

COST OF THE TRANSPORT SERVICE.

In response to an inquiry, the secretary of war has transmitted to the senate a statement of the expenditures of the army transports during and since the war with Spain. It shows that the total disbursements have aggregated $25,789,100. Forty-nine vessels of various classes were purchased at a cost of $8,074,455 and for refitting $5,189,093 was disbursed. The vessels chartered numbered 128, the amount paid vessels for services on the Atlantic being $2,882,284 and on the Pacific $7,749,235, while $1,891,342 was expended in fitting out the vessels and restoring them to former conditions at the end of their charters, making a total of $12,525,861 for the chartered service. The total shows that the amount paid the owners of three steamships for service on the Pacific was greater than the valuation of the vessels. They were the Zealandia, which was appraised at $250,000, and whose owners were paid $313,666 under three separate charters; the Indiana, valued at $450,000, and paid $469,166; the Ohio, valued at $450,000, and paid $543,785.

NAVAL MATTERS.

Secretary Long has ordered the establishment of a recruiting station at New York city in order to facilitate the enlistment of seamen. The station will be located in the down-town part of the city, where the sailors most do congregate. Returns from the navigation bureau this week show that the enlisted strength of the navy is 4,000 short of the strength allowed by law. A thousand of these are apprentices, for whom there are no quarters on shore, and therefore no attempt has been made to secure new boys.

The Confederate Museum of Richmond, Va., has secured the main shaft of the old frigate Merrimac. The Merrimac was later renamed the Virginia and the shaft bears the inscription that it was the propeller shaft of the Virginia and that in the engagements with the Minnesota and the Monitor the victory remained with the Merrimac.

The project of having training ships for boys who enlist in the navy is meeting with most unqualified success. The Buffalo, which has been transformed into a well-equipped training ship, will be in condition for service in a short while. There are now 450 recruits ready to be placed upon this vessel.

Representative Hawley has introduced a bill in the house to reclassify the navy. According to the bill vessels of the United States, except torpedo boats and other special vessels, shall be divided into four classes, and shall be commanded as nearly as may be as follows: First and second rates by captains; second and third rates by commanders; fourth rates by lieutenant commanders and lieutenants; torpedo boats and other unclassified vessels by officers below the grade of lieutenant-commander. Vessels of 5,000 tons displacement or more shall be classed as first rates; those of 3,000 tons or more and below 5,000 tons as second rates; those of 1,000 tons or more and below 3,000 tons as third rates; those of less than 1,000 tons as fourth rates.

MASTERS AND ENGINEERS.

APPOINTMENTS OF OFFICERS FOR SHIPS OF THE GREAT LAKES, SEASON OF 1900.

Montreal Transportation Co., Kingston, Ont.: Steamers—Active, Capt. John Gaskin, Engineer John Hamilton; Bronson, Capt. Joseph Murray, Engineer Robert Hepburn; Bannockburn, Capt. Alexander Milligan, Jr., Engineer Richard Taylor; D. G. Thompson, Capt. James Murray, Engineer George Henderson; Glide, Capt. Thomas Murphy, Engineer M. Rankin; Glengarry, Capt. Gordon Koan, Engineer Charles Napper; Jessie Hall, Capt. Charles Martin, Engineer George Tuttle; Rosemount, Capt. James Hawdesley, Engineer John Evans. Lake Barges—Dunmore, Capt. John Phillips; Kildonan, Capt. Maxine Lefebyro; Minnedosa, Capt. R. O. Irwin; Melrose, Capt. James Fleming; Selkirk, Capt. H. Colvin; Winnipeg, Capt. James Kirkwood. River Barges—Alberta, Capt. Frank Poirier; Acadia, Capt. Louis Benoit; Bella, Capt. Peter Lalonde; Cleveland, Capt. ————; Chicago, Capt. A. Charlebois, Sr.; Colborne, Capt. E. R. Roy; Corn Crib, Capt. ————; Cornwall, Capt. H. Boyer; Detroit, Capt. Truffle Daoust; Dorchester, Capt. Joseph Page; Eagle, Capt. A. Charlebois, Jr.; Hector, Capt. Theodore Leduc; Glengarry, Capt. ————; Iowa, Capt. Joseph Dauost; Jennie, Capt. A Sannersail; John Gaskin, Capt. Israel Dauorst; Lancaster, Capt. ————; McCarthy, Capt. ————; Montreal, Capt. A. Dolisle, Sr.; Maggie, Capt. A. Monette, Sr.; Nebraska, Capt. G. Lebeouf; Regina, Capt. A. Lalonde; Senator, Capt. M. Leduc; Star, Capt. E. Gecotte; Toledo, Capt. ————; Toronto, Capt. M. Bissonnette; Wheat Bin, Capt. Albert Major; Cobourg, Capt. Frank Lafrance; Brighton, Capt. N. Mallette; Kingston, Capt. Alexander Herbert.

Gilchrist, J. C., Cleveland: Steamers—C. B. Lockwood, Capt. C. T. Gunderson, Engineer Henry Jesson; City of Genoa, Capt. W. H. Blattner, Engineer James Mitchell; City of Naples, Capt. J. P. Minskey, Engineer John Parks; A. P. Wright, Capt. F. A. Goodell, Engineer James Birney; C. W. Elphicke, Capt. B. Moshier, Engineer William T. Schwacofer; Alexander Nimick, Capt. F. A. Graves, Engineer Ed Reilly; John Harper, Capt. W. C. Butts, Engineer Charles Gumlich; John Craig, Capt. J. C. Byers, Engineer John Seymour; R. E. Schuck, Capt. Charles Hahn, Engineer John Connelly; J. C. Gilchrist, Capt. W. G. Stewart, Engineer C. N. Allbee; City of Rome, Capt. John Q. Owen, Engineer A. F. Hogle; John B. Lyon, Capt. A. H. Senghas, Engineer Charles Willows; Tacoma, Capt. J. P. Cottrell, Engineer Samuel Moore; Cumberland, Capt. A. Ames, Engineer Frank Ouellette; Manhattan, Capt. J. C. Dobson, Engineer W. H. Pinkham; Merrimac, Capt. E. L. Ennis, Engineer John Callan; Massachusetts, Capt. W. H. Landgraff, Engineer Henry Mitchell; Hiawatha, Capt. R. J. Walder, Engineer R. O. Butler; Columbia, Capt. M. H. Clark, Engineer John Gaa; Waverly, Capt. H. G. Hayborger, Engineer Charles Martin; V. Swain, Capt. F. H. Reid, Engineer J. W. Douglass.

Richelieu & Ontario Navigation Co., Toronto, Ont.: Steamers—Quebec, Capt. L. O. Boucher, Engineer F. Gendron; Montreal, Capt. L. St. Louis, Engineer F. X. Hamelin; Berthier, Capt. C. Gouin, Engineer E. Arcand; Terrebonne, Capt. E. Gouin, Engineer A. de Martieny; Chambly, Capt. J. A. S. Paulet, Engineer C. Gendron; Three Rivers, Capt. F. St. Louis, Engineer J. Matte; LaPrairie, Capt. P. McLean, Engineer G. Gendron; Hochelega, Capt. H. Mandeville, Engineer F. Chapdelaine; Longueuil, Capt. F. Jodoin, Engineer N. Beaudet; Hosanna, Capt. D. Mongeau, Engineer E. Gendron; Mauche-a-Feu, Capt. F. Trepeau, Engineer B. Plautal; Sorel, Capt. A. Berthiaune, Engineer E. Beaueage; Saguenay, Capt. Charles Lapierre, Engineer E. Hamelin; Canada, Capt. Joseph Dugal, Engineer E. Denis; Carolina, Capt. G. Riverin, Engineer M. Latulippe; Toronto, Capt. H. Esford, Engineer William Black; Hamilton, Capt. A. J. Baker, Engineer R. Marshall; Spartan, Capt. H. P. Grange, Engineer N. Beaudin; Corsican, Capt. John McGrath, Engineer W. Parker; Algerian, Capt. D. Mills, Engineer Hazley; Bohemian, Capt. A. Dunlop, Engineer A. R. Milne.

Deseronto Navigation Co., Deseronto, Ont.: Steamers—Resolute, Capt. John Gowan, Engineer John Harrison; Reliance, Capt. James Dougherty, Engineer J. Lappings; Ella Ross, Capt. D. B. Christie, Engineer J. McFaul; Deseronto, Capt. William Skillin, Engineer O. Flood; Rescue, Capt. J. Rowe, Engineer J. McFaul, Sr.; Ranger, Capt. Samuel Anderson, Engineer Thomas O'Neill; Armenia, Capt. S. Anderson, Engineer T. O'Neill; Nile, Capt. W. J. Daly, Engineer L. Limlin.

Leatham & Smith Towing & Wrecking Co., Sturgeon Bay, Wis.: Steamers—Joseph L. Hurd, Capt. R. Cozallis, Engineer H. C. Buckman; I. N. Foster, Capt. Charles Packard, Engineer James Curry; Pewaukee, Capt. Sam Christerfersen, Engineer Mark Holt. Tugs—John Leatham, Capt. Henry Tufts, Engineer Edward Webber; George Nelson, Capt. James Tufts, Engineer John Riley. Schooners—Advance, Capt. A. Olsen; Alert, Capt. Abe Eavetson.

Niagara Navigation Co., John Foy, manager, Toronto, Ont.: Steamers—Chippewa, Capt. J. McGriffen, Engineer G. M. Arnold: Corona, Capt. William H. Holmes, Engineer William Walsh; Chicora, Capt. Robert Clapp, Engineer H. Parker; Ongiara, Capt. H. J. McIntyre, Engineer M. Carl.

Sinclair, Alex R., Duluth, Minn.: Steamers—Simon Langell, Capt. John A. Stewart, Engineer Robert Cameron; J. C. Suit, Capt. Edw. England, Engineer Arthur Thompson; H. A. Root, Capt. Wm. F. Thompson, Engineer ————. Schooner—Arenac, Capt. H. C. Kendall.

Carleton, Eugene M., Cleveland: Steamers—H. D. Coffinberry, Capt. William Ferguson, Engineer John J. Derry; N. Mills, Capt. Dan Warwick, Engineer ————; Eliza H. Strong, Capt. William Strong, Engineer ————. Schooner—Commodore, Capt. Peterson.

Pauly, H. J., Milwaukee: Steamers—Thomas Davidson, Capt. J. O. Wood, Engineer John McMillan; Walter Vail, Capt. Alexander Cleghorn, Engineer ————. Schooners—Baltic, Capt. Thomas O'Donnell; Aberdeen, Capt. Jonas Hansen.

Chicago, Saugatuck & Douglas Transportation Co., W. B. Griffin, Manager, Saugatuck, Mich.: Steamers—Saugatuck, Capt. John Campbell, Engineer W. S. Bradley; Charles McVea, Capt. William Turnbull, Engineer Henry T. Bender.

Sands, Louis, Manistee, Mich.: Steamer—Maggie Marshall, Capt. A. E. Anderson, Engineer William Martin. Schooners—Isabella Sands, Capt. J. L. Jensen; A. W. Luckey, Capt. Andrew Olson; Arendal, Capt. Anton Ericksen.

Mills, J. E., Port Huron, Mich.: Steamers—Argonaut, Capt. James H. Warwick, Engineer ————; H. J. Kendall, Capt. H. J. Kendall, Engineer ————; Thomas R. Scott, Capt. Paul Rivard, Engineer ————.

Bigelow Bros., Chicago: Steamer—Madagascar, Capt. John Jenks, Engineer Charles Nerretur. Schooners—S. M. Stephenson, Capt. Charles Konert; Fanny Neil, Capt. John Kemming.

Livingstone, William, Detroit: Steamers—Thomas W. Palmer, Capt. George F. Stilphen, Engineer Joseph W. McKittrick; Livingstone, Capt. Thomas McAlpine, Engineer Alexander Morison.

Marine Transit Co., Marine City, Mich.: Steamer—Zoltec, Capt. Wm. J. Tomlin, Engineer ———. Schooner—Zapotec, Capt. Peter Thompson.

Penoyer, W. C., Bay City, Mich.: Steamer—Robert Holland, Capt. Joseph Lowes, Engineer ————. Schooner—White & Friant, Capt. Lowes.

Beyschlag, Charles, St. Clair, Mich.: Steamer—P. J. Ralph, Capt. Henry Leisk, Engineer W. J. Bolton. Schooner—Harold, Capt. Thomas Leisk.

Lee, A. R., Detroit: Steamers—Idlewild, Capt. Jos. Cockridge, Engineer David Maxwell; Arundell, Capt. ———, Engineer C. H. McCarten.

Pringle, John, St. Clair, Mich.: Steamer—D. Leuty, Capt. John C. Pringle, Engineer ———. Schooner—Botsford, Capt. Sharrow.

Boyce, S. H., Grand Haven, Mich.: Steamer—Mary H. Boyce, Capt. W. F. McGregor, Engineer Oliver Beach.

Danaher, J., Ludington, Mich.: Steamer—W. J. Carter, Capt. A. C. Wanvig, Engineer ————.

Blood, C. E., Marine City, Mich.: Steamer—Tempest No. 2, Capt. Geo. B. Kendall, Engineer Charles Shunk.

Potter, Teare & Co., Cleveland: Steamer—Mary McGregor, Capt. Henry Brock, Engineer Geo. H. Bowen.

Seither, Frank, Cleveland: Steamer—V. H. Ketchum, Capt. Richard W. England, Engineer Emil Mercier.

Alger, Smith & Co., Detroit: Steamer—Gettysburg, Capt. S. H. Currie, Engineer Wm. P. Wenner.

Whitaker, Byron, Detroit: Steamer—Byron Whitaker, Capt. Lewis Elliott, Engineer D. W. Blauvelt.

Chandler, H. & J., J. W. Chandler, Manager, Detroit: Schooner—Senator, Capt. Chas. Anderson.

Hurd & Hollenstein, Buffalo: Steamer—Wotan, Capt. Joseph Shackett, Engineer ———.

Watson, Henry W., Buffalo: Steamer—Inter Ocean, Capt. Peter Wex, Engineer Thos. Ingram.

Fisher & Wilson Lumber Co., Cleveland: Steamer—Argo, Capt. Geo. L. Cottrell, Engineer ———.

Durand, Homer, Toledo, O.: Schooner—P. B. Locke, Capt. H. Durand.

CONVENTION OF MANUFACTURERS.

The fifth annual convention of the National Association of Manufacturers will be held in Boston on April 24, 25 and 26. The business sessions will be held in Tremont Temple. The convention will be called to order at 10 o'clock Tuesday morning, April 24, and business sessions will be held morning and afternoon on Tuesday, Wednesday and Thursday. The concluding session on Thursday evening will take the form of a banquet, which will be tendered by the citizens of New England to members of the National Association of Manufacturers coming from outside of New England. This banquet will be held in the Mechanics' building, and will form one of the most important functions of the sessions of the Association. It will bring together not only members of the National Association of Manufacturers, but a large proportion of the membership of the New England Cotton Manufacturers' Association, the National Association of Wool Manufacturers, the New England Shoe and Leather Association, and the American Paper and Pulp Association, all of which have been invited to co-operate in this final feature of the convention. It is expected that President McKinley will be the guest of honor on this occasion, with the Chinese minister, Russian ambassador, Hon. John D. Long, secretary of the navy, and other men of note in public life.

It is said that the Cramps paid $250,000 cash for the plant of the Charles Hillman Ship & Engine Building Co., which adjoins a part of their works and which they purchased several days ago. The property is subject to two mortgages, held by the Clyde Steamship Co., for $50,000 and $15,000 respectively. The plant includes a marine railway, ready for immediate operation, and machine and boiler shops equipped with modern appliances, besides pattern shops and a mold loft, together with a wharf 42 feet wide and extending into the Delaware river for 155 feet. The yard lies alongside the Cramp dry docks and will be used for repair work, thus greatly relieving the main yard, and giving the Cramps a much-needed extension of facilities. The Hillman ship yard suspended operations two years ago, on the death of Charles Hillman, the founder of the enterprise. Last year a company was organized with a capital of $600,000 to float the concern, but nothing was done in the way of a resumption of work.

The largest steamer ever constructed in a French ship yard, the Savoie of the Compagnie Generale Transatlantique, was launched a few days ago at St. Nazzaire. She is 533 feet long and 60 feet beam. Her tonnage is 10,500, and her engines are of 12,000 H. P., calculated to give her a trial speed of 22 knots. She will run on the line between Havre and New York.

GREATEST WATER POWER DEVELOPMENT IN THE WORLD.

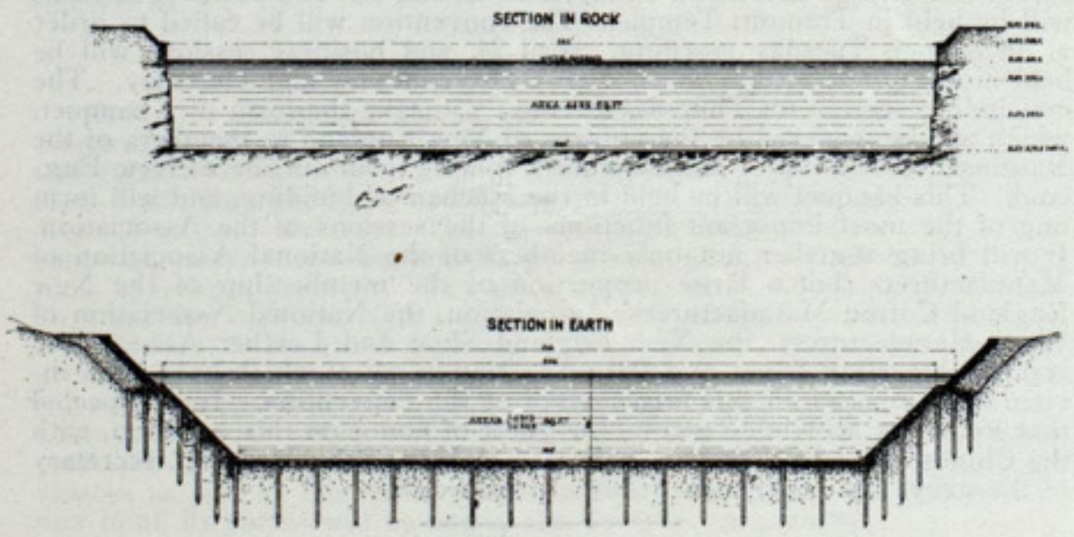
(Continued from page 15.)

be converted by the most direct known process into electric energy, and of the latter the above quantity is to be available chiefly by the electro-thermo and electro-chemical application of the current. The power canal will take the water from the river above the rapids (very close to the upper entrance to the United States ship canal), carry it through the city of Sault Ste. Marie for a distance of about two miles, pass it through turbines located in a power-house just below the rapids, and there discharge it back into the river. The opening to the intake is from the navigation channel above the ship-canal entrance, and is said to have an area of 15,000 square feet, through which, it is claimed, the required volume, 30,000 cubic second feet, will pass with a velocity of less than 2 feet per second, or less than 1½ miles an hour. The intake at the entrance is about 891 feet wide and 18 feet deep, and continuing easterly gradually narrows, retaining this depth. The bed is to be left in its natural condition, but the banks will be retained by timber cribs and bulkheads ballasted with broken stone. The excavation of this intake was completed last fall, the material, some 300,000 cubic yards, having been removed by dredging and disposed of on property of the power company along the Canadian shore. About one-half of the retaining crib structures along the south side of the intake have also been completed. At a point about 1,000 feet east from the center of the entrance the intake merges into the canal proper. At this point a clay coffer-dam, retained by stone-ballasted timber cribs, has been constructed so that all excavation east of this point can be done in the dry.

From this cofferdam the canal traverses a sandstone formation through which a channel is being cut with a width at bed of 200 and at surface of 203 feet, the depth being such that 22 feet of water will flow through it, which requires an average cut through this rock of about 30 feet in depth. This rock section is about 4,100 feet length and is on continuous tangent location. The area of the canal here is 4,425 square feet, and the bed will be given the slope required to produce a velocity of about 7 feet per second. In order to reduce this slope to a minimum, as its accumulation means final loss of head, the canal sides and bed will be finished as smooth as possible, thereby reducing the loss of energy in the flowing water resulting from its friction against rough surfaces. The rock sides of the canal are first cut out by channelling machines, and after the rock is drilled, blasted and excavated, the sides, wherever rough, are smoothed off by Portland cement mortar. The bed will be similarly finished. More than one-third of the rock section has been excavated.

Leaving the rock formation the canal traverses sand, gravel and clay for a distance of about 6,000 feet. In the first 100 feet of this earth section the rectangular prism is gradually converted into one of trapezoidal form, the sides and beds being shaped and retained by Portland cement of concrete construction. The canal in earth for the first 3,000 feet is 164 feet wide at bed and 214 feet at water surface, with side slopes of one in one and of sufficient depth to carry 23 feet of flowing water. The area of this prism is 4,313 square feet, and the bed is given the proper slope to produce a flow of about 7 feet per second, thus insuring the passage of about 30,000 cubic second feet. This portion of the earth section is tangent, excepting two short deflections of three degree curvature. The lower 3,000 feet of canal in earth is on a continuous 3-degree curve. The prism is 174 feet at bed, 224 feet at water surface, and of the same depth as the other earth canal. The area of this prism is thus increased to 4,543 square feet in order to counteract the retarding influence of curvature of conduit.

The entire canal in earth is to be revetted and lined with timber below and paved with rock above water. For this purpose the bed and slopes are secured by piles being driven 5 and 10 feet centers to depths from 12 to 20 feet. Log sills are secured to pile heads across the canal bed and up the slopes, and a closely laid floor of deck planking is put upon these



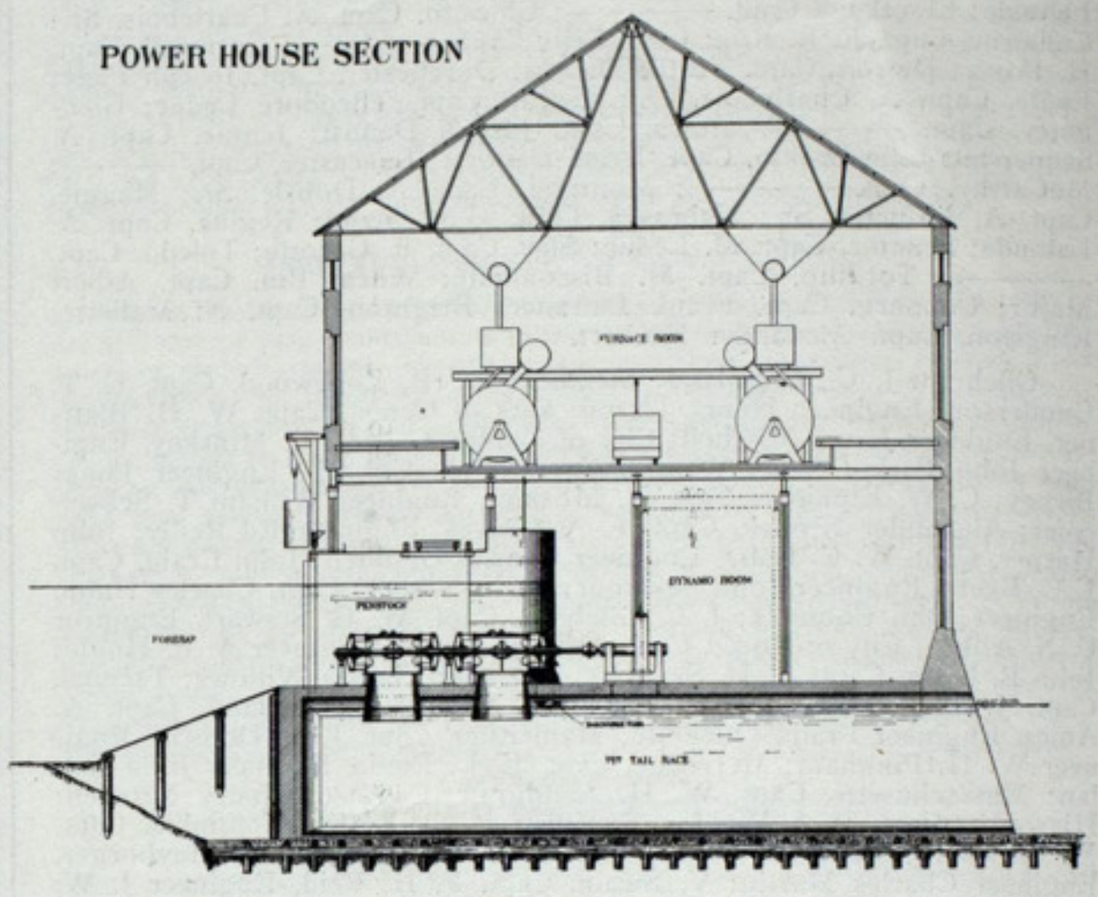
TWO TYPICAL SECTIONS OF WATER POWER CANAL.

sills. In this manner the uniformity of prism shape and area is preserved against all controllable influences and the surfaces with which flowing water comes in contact are rendered perfectly smooth, thus reducing friction and consequential loss of energy to a minimum. The construction of the earth canal requires removal of about 1,500,000 cubic yards of material, of which one-third has been excavated, while nearly 15,000,000 feet of timber have been secured for the revetment and a considerable number of piles driven. This is the end of the canal proper which crosses in its course thirteen streets, at all of which abutments for single-span bridges are to be erected, two of which are now completed. The city of Sault Ste. Marie has entered into contracts for the erection of five steel highway bridges, 260 feet long, which will be erected during the coming summer.

THE LARGE FOREBAY AND POWER HOUSE.

At the lower end the canal widens out into the forebay or mill pond, for the purpose of securing sufficient frontage for the uniform distribution of the water to all of the turbines which will be installed, along the river face of the forebay, in the power-house. The depth of this forebay is the same as that of the terminal of the earth canal without slope. By reason of this expansion the water issuing from the canal will at once disperse and enter the turbine chambers at a velocity not exceeding 2 feet per second. The side slopes of the forebay are one in one, and revetted, timbered and paved similarly to those of the earth canal. This is the only part of the entire conduit where the water will rise above the level of the surface of the natural banks, and therefore embankments have to be constructed. These will be 50 feet wide at base and 25 feet at crest, and are being formed out of clay puddle, which will render them impermeable to water. Nearly three-fourths of the forebay has been excavated and the embankments are now nearing completion.

The forebay is closed by the power house, which is located along the river front, and really stands in the river proper. This structure will be 1,368 feet long, 100 feet wide and 125 feet high, of which 106 feet will be above water. The foundation area for this structure is 1,400 by 125 feet, which has been coffer-dammed from the river by a substantial structure of sheet piling filled with clay. The entire foundation site has been excavated. The foundation proper is to be on piles set in stiff clay to refusal, covered by timber grillage of log sills and caps filled and covered with



SECTION OF WORKS WHERE 40,000 HORSE POWER IS TO BE DEVELOPED IN THE NEW AMERICAN CANAL.

Portland cement concrete to a depth of 3 feet, the whole to be surrounded by a sheet pile bulkhead. The sub-structure of the building is erected upon this foundation and consists of eighty-one masonry walls 100 feet long, 25 feet high and 3 feet thick, which stand 16 feet 6 inches center, and are closed on the forebay side by eighty-one arched masonry walls of the same height and thickness and covered by arched masonry roofing, with 18-inch thick crowns, forming horizontal masonry shafts closed on all but the down stream ends. The masonry in all these structures is of Portland cement concrete, laid monolythic or formed into blocks of different designs. Work on this material is going on continuously and a considerable number of these blocks have been fabricated. The masonry shafts—called pits—serve, in addition to supporting the superstructure, for the purpose of delivering the water discharged into them from the turbines above, back into the river. The discharge area of each pit is 200 square feet (below the surface of mean lower level) and as there are eighty pits their combined discharge areas equals 16,000 square feet, through which 30,000 cubic second feet of water are returned to the river, flowing out, therefore, with a mean velocity of less than 2 feet per second or less than 1½ miles per hour. This water is discharged into the river on a line parallel to the government dock line and 250 feet south of it, and therefore on a line about 500 feet distant from the sailing line followed by vessels going into or coming out of the American ship-canal.

The superstructure of the power house consists of eighty penstocks or turbine chambers, and one spillway, and of dynamo and mill floors. The penstocks are all of uniform dimensions and similar construction, being 40 feet long, 15 feet wide and 20 feet high. They are separated by partitions of steel beams filled and faced with Portland cement grouting, closed on the down-stream end by steel plate bulkheads, braced on the top by steel trusses, and entirely open on up-stream end, and all these structures are properly secured to the masonry below. The dynamo floor is continuous on the river side of the penstocks, being the roof of the pit structures. The mill floor is above the penstocks, resting on steel columns and being formed of concrete arches laid on steel floor beams and steel box girders. The walls of the building above water are to be of the native sandstone. The roof will be of corrugated iron laid on steel frames. All the structural steel material required for this power house has been secured and is now being framed up and inspected. The stone has all been quarried.

POWER HOUSE EQUIPMENT.

The equipment of the power house will consist of 320 turbines of the McCormack type, as manufactured by the J. & W. Jolly Turbine Co. of Holyoke, Mass. Four of these turbines in pairs will be placed in each penstock in tandem fashion, resting on steel beam frames secured to the masonry substructure. They are all joined to one shaft of pressed steel and are housed in iron cases, leaving no openings except for the passage of the water when it is desired to operate them. Steel plate draft tubes 7 feet in diameter are secured to the bed frame of each pair of turbines, penetrating the concrete pit roofs into the water below. The water enters the open penstock standing 13 feet above the floor, and the guide vanes and buckets of the turbines, passing down through the draft tubes into the pit, and thence back into the river; and while thus passing through

the turbine it revolves the same and the shaft fixed to it. The electric equipment will consist of eighty single-phase dynamos, which are now being constructed by the Westinghouse Electric & Manufacturing Co. and which will be coupled to the turbine shafts penetrating the penstock bulkheads by a proper stuffing-box.

A proper control of the water to be used involves the taking in and discharging of a constant quantity; the ability to control the amount taken or delivered by any reasonable portion, or to stop the inflow or efflux entirely; the protection of the conduit and the entrance and exit areas from undue obstructions by ice, logs, sand or other causes. Near the upper end of the rock canal a movable dam will be erected for the purpose of stopping all or any portion of water from entering the canal. This structure will consist of four leaves, 50 feet long and 28 feet high, suspended from and operating between masonry abutments. Each leaf will be a steel frame with ten vertical subdivisions, each of a 4½-foot wide opening, which will be closed by a series of four butterfly shutters revolving on a universal vertical shaft. When water is freely entering the canal these leaves will be suspended horizontally from a highway bridge structure, and when it is desired to stop the water from entering the canal the leaves will be lowered against a proper masonry sill in the canal bed, the valves remaining open during this lowering, but being revolved and closed after each leaf has found rest against the sill. This structure is being designed by the Detroit Bridge & Iron Works and it is believed will be effective in its operations. In order to keep water out of any or all of the penstocks, timber gates of the arched stop-log type will be provided. To guarantee the diversion of a constant volume of water each penstock bulkhead has secured in it two steel tubes of a quarter-turn form emptying through the masonry pit roof. The combined discharge capacity of these two tubes under a head of 16 feet equals the discharge capacity of the turbines occupying the penstocks, and thus if the turbines are not operating, the same quantity of water may be discharged by way of these tubes. They are fitted with stop valves. In the matter of preventing interference from ice or logs has been decided to place a log shearing boom in position at the intake entrance to deflect all float ice toward the rapids. An intercepting steel rack will be erected in the throat of the forebay with an ice or log chute leading from its apex into a spillway in the center of the power house, thus providing for the intercepting of all floating materials and safe conducting of the same into the river. Sand may be expected to be carried in through the intake, and it is therefore necessary to provide for its interception by suitable and frequent channels cut in the rock canal, whence it can be removed periodically by pumps.

ENGINEER IN CHARGE—CONTRACTORS ON THE WORK.

Mr. H. von Schon, the engineer in charge of this project, is quite well known among hydraulic engineers throughout the country and to the army engineer corps. He was educated in German technical institutions, graduating in Berlin in 1869. After absorbing the required military service, during which period he took part in the Franco-Prussian war of 1870-71, he came to this country and practiced engineering in its various branches in the east, starting as an assistant to a county surveyor. He soon drifted west and was engaged in railroad and mining engineering. About the eighties he became more especially interested in hydraulic engineering in the southern states. In 1890 he became connected with river and harbor works with the United States engineer corps, and was engaged at that kind of work until 1896 when he took up the work on which he is now engaged.

The contractors are as follows: All excavation, E. D. Smith & Co., Philadelphia; dredging and other work at intake, W. H. Hubbel Co., Saginaw; construction of power house and movable dam, Mason Hoge & Co., Frankfort, Ky.; abutments for bridges at street crossings, T. H. Riddle & Co., a Massachusetts concern. At the works of the Webster, Camp & Lane Machine Co., Akron, 1,600 to 1,800 tons of material is being worked up, including casings, beams and supports, shaftings, floor stands, etc., for the turbine installation. The J. & W. Jolly Turbine Co. of Holyoke, Mass., is making 160 turbines, one-half of the entire installation which is to go in at once. The dynamos—there will be eighty in the entire installation—are to be of Westinghouse manufacture. About 3,000 tons of plates and shapes for the power house are being rolled by the Carnegie Steel Co. at Homestead and at one of the Pittsburg mills. About half of this order has been filled and the material turned over to the Shiffler Bridge Co. for shop work—shaping, framing and connecting.

As an indication of the very large interests that are now operating under the direction of Francis J. Clergue, the following companies may be noted: Sault Ste. Marie Pulp & Paper Co., operating the pulp mills at Sault Ste. Marie, Ont.; Algoma Iron Works, the mines and other property in iron region now being developed; Tagona Water & Light Co., a local electric lighting concern at Sault Ste. Marie, Ont.; Lake Superior Power Co., controlling 3,000 acres of land and water power at Sault Ste. Marie, Ont.; Michigan Lake Superior Power Co., controlling water power at Sault Ste. Marie, Mich.; Algoma Commercial Co., Ltd., engaged in building of railway; Algoma Central Ry. Co., to build 400 miles of railway from the Sault to Hudson bay; American Alkali Co., to use part of water power at Sault Ste. Marie, Mich.; Canadian Electro-Chemical Co., to use power at Sault Ste. Marie, Ont.

The battleship Wisconsin, now being built at the Union Iron Works, San Francisco, will be taken out for a trial trip next week. The ship is almost completed and if the remainder of her armor for the turrets was to be had she could be put in fighting shape within a few weeks. The heavy guns of her batteries are in place and mounted, the last four thirteen-inch guns being placed last week. The vessel's machinery has been given several tests with the boat tied up at the docks. The builders are anxious that she shall come up to the standard of the battleship Oregon.

Capt. A. Boole of Ross Valley, Cal., and a number of San Francisco capitalists contemplate the establishment of a shipbuilding plant in South Sausalito, Cal., during the present summer. The company of which Capt. Boole is the head has a ship yard on the Oakland canal but is in need of more extensive quarters. The intention of Capt. Boole is to erect a ship yard as well as a dry dock. It is understood that over a thousand men will be employed.

NAVAL POLICY BOARD'S FIRST MEETING.

The first meeting of the naval policy board has been called for April 15 and thereafter the board will probably meet once a week until it has reduced its work to routine form. The work of the board will be without precedent. It is true that heretofor what are known as the intelligence bureaus of the war and navy department have endeavored to compile and to have in shape for use, in case of hostilities, information respecting the resources in a warlike way of other nations. The policy board is to undertake this work on a larger scale and probably will be guided by European methods. It will be its business to provide in advance and have ready for instant use completely worked-out plans of naval campaigns, offensive and defensive, applicable to any maritime power with which the United States may by any possibility come in conflict in the future. The preparation of these plans involves an enormous amount of work, theoretical and practical. The military and naval resources of foreign countries must be ascertained to a nicety and this information must be kept thoroughly up to date. Accurate coast charts and plans of defenses must be secured in order to avoid as far as possible such serious omission as that made by the British authorities in the case of the geography of the Transvaal.

The war college will probably be called upon to assist in the work by continuing on an enlarged scale the planning of the utilization of the United States naval forces in defensive campaigns. Another branch of the work will be the preparation of plans for naval operations when the navy is called upon to act in conjunction with the army, both offensively and defensively. This involves questions of harbor defense and the protection of the naval stations. The Pearl harbor board is now engaged on a scheme for the establishment and fortification of a naval station in that harbor and it is probable that this report will be submitted to the policy board before any attempt is made to carry into effect its recommendations. It is possible that when Pearl harbor has been disposed of steps will be taken to consider the establishment of a naval station at Guam.

CONTRACTS FOR THE REVENUE CUTTERS.

The William R. Trigg Co. of Richmond, Va., has been awarded the contract by Capt. Shoemaker of the revenue cutter service for the construction of the revenue cutter for the great lakes and also for the revenue cutter for the Pacific coast. The company's bid for the first was $157,000 and for the second $217,000. The Townsend & Downey Ship Building & Repair Co. of New York was the lowest bidder for the cutter for the great lakes, but the department feared that the company could not complete it on time. Both of these cutters were fully described in the naval edition of the Review. The cutter for the great lakes is officially designated as No. 7 and is to be of the following dimensions: Length over all, 178 feet; length between perpendiculars, 162 feet; breadth of beam, molded, 30 feet; depth at side amidships, 15 feet. The vessel is to be built of steel throughout and is to be equipped with a vertical, inverted cylinder, direct acting triple expansion, surface condensing engine with cylinders of 17, 27 and 43 inches diameter and 24-inch stroke.

The Pacific coast cutter is known as No. 8 and will be a sheathed ship of the poop and forecaste deck type, the principal dimensions of which are as follows: Length over all, 205 feet 6 ins.; length between perpendiculars, 188 feet 6 inches; beam, molded, 32 feet; beam, extreme, 32 feet 10 inches, and depth at side amidships, 17 feet. This vessel is to be of steel throughout and will be propelled by one vertical, inverted cylinder, direct acting triple expansion engine, having cylinders of 25, 37½ and 56½ inches diameter, with a common stroke of 30 inches.

Naval Constructor F. T. Bowles, capable, cool and incisive, of whom more doubtless will be heard before his naval career is over, gave the house naval committee the other day nine reasons why battleships should be constructed in navy yards and nine reasons why they should not. Which shows that Mr. Bowles, while personally an advocate of navy yard construction, is eminently of a judicial turn of mind and can see both sides of the question. But there was one reason which the naval constructor omitted, and which, indeed, should have been uppermost in his mind. That is the question of political interference—a pernicious and ever present factor. The construction of a battleship in a navy yard would vastly add to the complement of men, and Naval Constructor Bowles knows, and every naval officer knows, to his sorrow, that these men would be appointed not for their knowledge of ship construction, but for their political influence. The yards would be overrun with men who could not distinguish between the bow and the stern of a ship but who through accident of residence had rendered some service to a party boss.

The first test of the Kearsarge's battery is clearly in favor of the advocates of the superimposed turret system. Three guns of the forward battery were fired simultaneously without noticeable shock to the ship and with no visible interference. This demonstrates the practicability of a terrible concentration of fire upon the enemy's ship. The force of it can best be conveyed by the simple statement that the batery can project at a single discharge a ton and a half of metal. The enthusiastic endorsement of the system by Rear Admiral Sampson has little weight since he was pledged beforehand to it; but Capt. Folger's indorsement must be seriously considered since he is a convert. However, one test does not mean success and concentration of fire is not everything. There yet remains the question of the practicability of the system in actual warfare. The first shot from the enemy, well placed, might render useless the machinery of the turret even if it did not injure the guns. To put a double turret out of action is practically to deprive a ship of half its battery. Does the added concentration of fire compensate for this possible danger?

The San Francisco Call is authority for the statement that the Risdon Iron Works of San Francisco, having completed a deal to secure control of the Pacific rolling mills, will expend about $3,000,000 in constructing a complete ship building plant and in erecting a dry dock capable of receiving the largest ship afloat. It is also said that the new concern will compete for the construction of battleships and other craft of the largest size.

NEW OFFICES OF THE WESTINGHOUSE COMPANY.

It was in 1894 that the Westinghouse Electric & Manufacturing Co. removed from the city of Pittsburg to the site of their present works at East Pittsburg, twelve miles distant from the city. At that time the electrical business had violated all precedents, and the buildings were inadequate for the requirements of the expanding manufacture. A large tract of land was acquired at East Pittsburg, upon which new works were erected on a large scale and were equipped with the latest machinery and labor-saving appliances. The buildings were so designed that future extensions could easily be made without detriment to the existing plant. Last year the works again proved unequal to the demand for Westinghouse apparatus, more especially as the size of individual machines had increased, until generators of 5,000 horse power have become frequent, and in some instances have reached to 8,000 horse power. Recent additions to the works already completed and those now in course of erection will bring the floor space to about 500,000 square feet, equal to 11½ acres.

About a year ago it was determined to erect instead of temporary quarters permanent offices which should be of sufficient size to afford accommodation for the staff of the numerous departments of the business. The architectural features and the general arrangement have been under the supervision of Mr. George Westinghouse, than whom no one is better qualified to provide for the present and future requirements of this immense enterprise, as through his untiring energy and keen foresight the company has secured a position second to none in the electrical field. The building just completed, stretching across the end of the main works, is conveniently situated for access from the East Pittsburg station on the main line of the Pennsylvania Railroad. The length of the building is

NEW WESTINGHOUSE OFFICES, PITTSBURG.

250 feet with a depth of 50 feet and seven stories in height. The facade and architectural features are shown in the accompanying illustration. The material used is Vamport brick of a buff color, specially made to harmonize with the Beaver Valley stone facings, the walls being carried up 5 feet above the ground with rock-faced stone. The entire building is fireproof, rows of steel columns being carried longitudinally through the center. The floors and partitions are of terra cotta, the former built with arches above which are mud sills bedded in concrete.

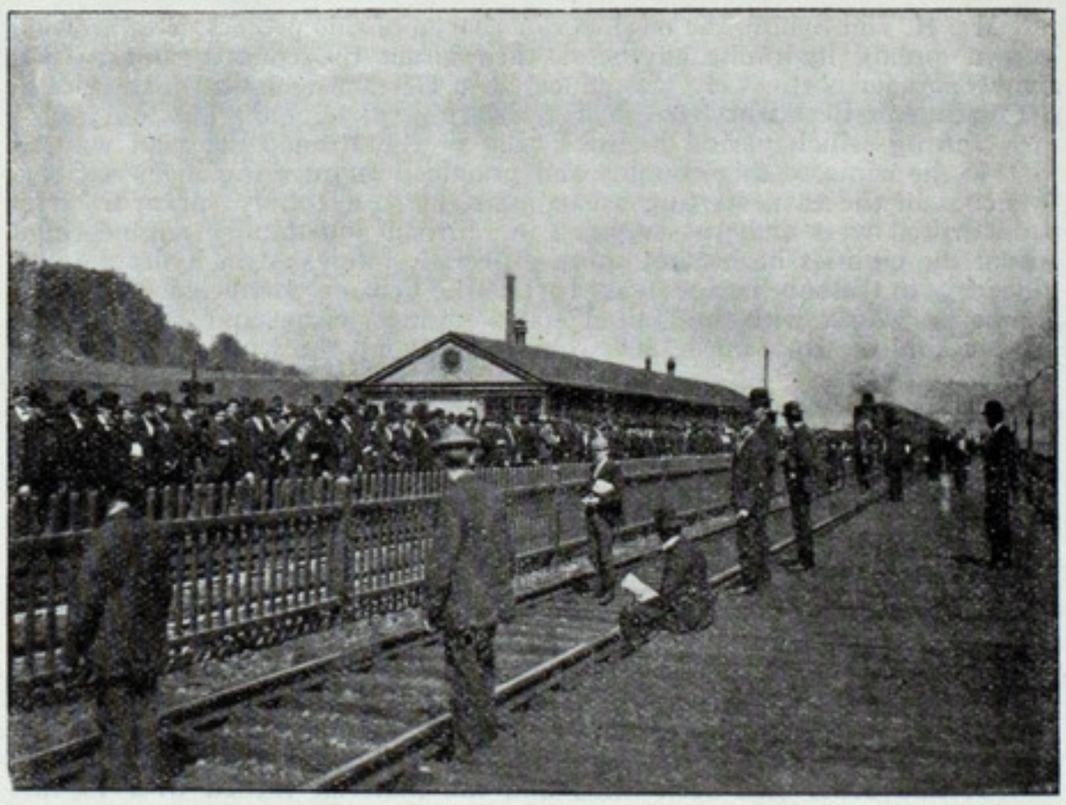
The total number of employes at this company's works at East Pittsburg is close upon 5,500, requiring several special trains, each of twelve cars, for their conveyance to and from the works. The scene at the railway station shows a portion of the office staff and employes awaiting the arrival of a train at East Pittsburg to carry them to their homes. A covered way leads from the railway station to the new offices. The main hall and the upper hallways are tastefully decorated with white Sicilian marble, the walls and ceiling being panelled, and the floors are of mosaic and tile. Two high speed passenger elevators rise through the building to stair halls on every floor and a broad marble staircase provides means of ascent also. Immediately within the entrance at the southwestern extremity of the building is the employment office where operatives for the works are engaged. Further along on this floor are extensive storerooms for the small parts and supplies used in the construction of electrical apparatus. There is also an office for the storekeeper and his clerical staff. The eastern extremity of this floor is spanned over for the railway entrance to the works. Freight cars from the Pennsylvania main lines are brought direct into the works for delivering foundry castings and other material and for loading the finished electrical apparatus. Mounting by one of the elevators to the Mezzanine floor one enters the works' office. Upon either side of the central passage are offices devoted to the superintendent, engineer of works, the construction department and the production department.

A novel feature has been introduced by devoting one end of the building to fireproof vaults. Twenty-four feet from the outer wall, a fireproof brick wall is carried upwards from the foundation to the roof, forming fireproof vaults upon the several floors, each having an area of 1,200 square feet. Entrance to these six vaults is through two sets of double fireproof iron doors on each floor. The vaults are for the safe custody of the valuable plans and blue prints of electrical machinery, the general books and records of the company, and for the large collection of negatives, photographs and electrotypes.

Upon the second floor near the elevator is a handsome reception room for visitors, and to the right a door opens upon the suite of rooms devoted to the managers and their assistants, including rooms for the president, vice-president, acting vice-president, the manager of works and for the clerical staff of this department. To the left of the entrance lobby are the general business offices, those of the sales manager and sales department and of the domestic and foreign correspondence departments. The arrangement of the third floor is similar to that of the second. The suite of offices to the right are occupied by the Westinghouse company's publishing department and the purchasing agent and his staff. To the left from the hallway are the accounting offices, those of the auditor and his staff, the paymaster, the assistant treasurer and the offices of the legal department, and of the cost department. The arrangement of the fourth floor differs from those below by the omission of the central corridor. The entire floor is occupied by the mechanical engineering department, and by the draughtsmen. The fifth floor is similar to the fourth. The electrical engineers are housed on this floor. Upon the sixth floor are two dining rooms handsomely wainscoted with mahogany, the upper walls being tinted. Adjoining them is an ample kitchen and butler's pantry. One of the rooms on this floor forms the "Central" for the telephonic system and another serves as a dining room for the female stenographers.

The ventilation of the building has had great care. Upon the sixth floor under the roof is a large horizontal ventilating shaft running from end to end of the building, flues connecting each room with the main shaft. An electric motor operates a Sturtevant fan in the center of the main shaft, which during the winter expels the vitiated air, driving it above the roof. Fresh air is admitted into the offices by a part of the heating system, passing through shafts in the wall behind radiators, which heat the air as it is admitted. The building is amply lighted throughout by electricity, the current being obtained from the central power house of the company. The heating of the building is by direct radiation using steam from two 50 horse power tubular boilers installed upon the ground floor. There are nearly fifty radiators on each floor. Thermostatic valves automatically govern the temperature. When a certain amount of steam is admitted, the heat expands the joints, closing the valves and cutting off the steam, and when the temperature falls, the valves reopen admitting a further supply of heat. A Warren-Webster vacuum pump removes the condensed water from the radiators and pipes, and an electrically driven pump passes it to the boilers. Large and ample toilet rooms are provided in every story. The floors are tiled, and white marble is used for the wainscoting, partitions and washstands, the latter being supplied from the boiler room with hot and cold filtered water. The open plumbing follows the latest approved methods, and great care has been taken with the ventilation and sanitary arrangements.

Probably the most novel feature of the recent improvements made in the East Pittsburg establishment of the Westinghouse company is the



WESTINGHOUSE EMPLOYES AT PENNSYLVANIA RAILROAD STATION.

system of pneumatic tubes whereby all works departments and all the offices are connected through a central exchange station. The central station of the pneumatic system is on the second floor, and contains twelve sending and receiving tubes, furnishing service to all floors of the office building and to the important points in the works. The tubes are of 2¼-inch brass, the longest line being 3,500 feet, the circuit of which can be made in from 40 to 45 seconds, or at a speed of about a mile a minute. The system is operated by a positive exhauster of the Connellsville type, which exhausting the air from the tubes allows an inrush of air from the atmosphere which forms the pressure that propels the carriers and their freight to their destination where it is discharged through an air valve which immediately closes, thus forming the circuit back to the starting point. The pressure, or vacuum maintained is about 24 ounces, which is capable of handling a carrier and load equal to 8 pounds at the speed mentioned above. All the mail and other matter is thus distributed in a very much shorter time than could be delivered by messengers.

Prospects are said to be bright for the passage of a bill by the present congress appropriating $400,000 for the construction of a gunboat for the use of the naval militia on the Mississippi river. The bill was introduced recently by Congressman Marsh. The immediate benefit would fall to the second ship's crew of the Illinois naval militia, whose detachments are located at Rock Island, Moline, Alton, and Quincy, and the naval militia of Chicago might also take an occasional cruise on the rivers, but the greatest good to be accomplished by the construction of such a vessel would be the encouragement which it would give for the formation of a naval militia in all the states reached by the Mississippi system. This is the ground on which the friends of the bill are urging its passage through congress.

STEEL THAT SATISFIES LLOYDS.

Secretary A. G. Dryhurst of Lloyd's Register of British and Foreign Shipping writes as follows to the Bethlehem Steel Co. under date of March 8:

"I have the pleasure to acquaint you that the general committee at their meeting to-day have been pleased to decide to include your name in the list of manufacturers who have satisfied the committee as to their ability to produce steel which will comply with the requirements of the rules of this society. This decision is subject to all tests with respect to material manufactured by you for use in the construction of vessels or machinery intended for classification in this society's register book being carried out in accordance with the requirements set forth in the rules, and in the presence of a surveyor to the society; and also to the records kept at your works of the charges being at all times in such a condition as to admit of each bar or plate being traced to its charge."

Officers of the Bethlehem company naturally regard this letter as highly complimentary, although it is only another evidence of the reputation which they have gained as manufacturers of marine shafts and general forgings of undoubted excellence.

A YEAR'S OUTPUT AT THE VULCAN WORKS.

During last year the Vulcan Shipbuilding Co., Bremen, completed five cargo and passenger steamers, six fishing smacks, eight engines of 5,000 horse-power, a spinning machine, twenty-two boilers, etc. The largest number of men employed at any one time was 1,400. The profit for last year was about $126,000. After writing off $36,750 for depreciation, and adding $5,000 to the special reserve fund, a distribution of 12 per cent. is made. The company had on hand at the commencement of the year eight cargo and passenger steamers of 27,000 tons, ten engines of 11,500 h. p., a spinning machine, and twenty-two boilers. A large number of new machines have been added to the works, and also a new foundry, and a revolving crane of 120 tons lifting capacity is being built, while more ground has been purchased for the building of large vessels. These improvements will, it is stated, necessitate the increase of the company's capital by $75,000.

OLDS GASOLINE ENGINES.

Gasoline engines of 2, 4, 6, 9, 12, 16 and 30 horse power are made by the Olds Motor Works, 1323 Jefferson avenue, Detroit. A four-cylinder engine of marine type made at these works is shown in an advertisement on page 25 of this issue. It is claimed that Olds engines represent the highest type of motors using gasoline. A new catalogue just issued will be furnished upon application and with the enclosure of a postage stamp. A factory for the manufacture of stationary engines is maintained at Lansing, Mich.

The lack of commissioned officers of the line in the navy is illustrated by the fact that on the battleship Iowa a naval cadet is standing regular deck duty as watch and division officer, relieving and being relieved by commissioned officers who are old enough to be his father.

SPECIAL ATTENDANTS FOR TRANSATLANTIC TRAVELERS.

The bureau of attendants for trans-Atlantic travelers established in Jersey City and New York city twenty years ago by the Pennsylvania system, has proven a great convenience to persons making European trips and to tourists arriving in America at that port. It will be particularly convenient for visitors to the Paris exposition because the departure docks of most of the Atlantic steamship lines are convenient to the new Jersey City passenger station of the Pennsylvania Railroad Co.

This bureau consists of experienced agents whose duties are to meet passengers arriving in Jersey City and New York over the Pennsylvania lines and assist them in arranging for trans-Atlantic trips via any of the steamship lines by conducting them to steamships and aiding in preparations for a trip abroad. These agents will provide cabs operated by the Pennsylvania system and aid passengers with their baggage. They are fully posted on matters pertaining to steamships leaving New York, and arrangements can be made through them for procuring steamship tickets in advance.

They also meet incoming steamships to aid travelers in shaping details for continuing journeys from New York over the Pennsylvania lines by furnishing tickets, arranging for the transfer of baggage from steamship docks after it has been passed by customs inspectors, and having the same checked through to destination. They will reserve sleeping car accommodations and relieve persons of the foregoing details, making themselves useful as attendants and guides free of charge.

Further information on the subject may be obtained by addressing the nearest Pennsylvania lines ticket agent, or C. L. Kimball, assistant general passenger agent, Cleveland.

KAISER INTERESTED IN AMERICAN TOOLS.

In the Weser Zeitung, a daily paper published in Bremen, Germany, there appears an article dealing with the emperor's tour of inspection of the ship yards, in which the following paragraph appears:

"The kaiser now rode with his suite to the dry docks and inspected the nearly-finished battleship C, which was begun Sept. 30 of last year. The kaiser showed great interest in the working of the new and latest improved pneumatic tools, furnished by Messrs. Schuchardt & Schutte, being used in the building of this ship. These tools were being employed in all branches of the work—drilling, reaming, tapping, calking, chipping, riveting, etc."

Messrs. Schuchardt & Schutte are the German representatives of the Chicago Pneumatic Tool Co., who have representatives in all parts of the world.

Editor Marine Review:—I note in the Marine Review of March 29 reference to the performance of a so-called simplex featherweight air pump, and agree with your correspondent that it is a good and efficient machine. At the same time I think it only right and proper to inform you and the readers of your valuable paper that I have built these identical machines, except with my own steam valve motion, for the past eighteen years, and under a recent test produced a vacuum of 29 inches.

M. T. DAVIDSON.

Brooklyn, March 31, 1900.

AROUND THE GREAT LAKES.

Mr. W. H. Vance of Milwaukee, announces that the firm of W. H. Vance & Co. has been dissolved, but that he will continue in business at 209-211 Brown building, Summit and Madison streets.

The steamer A. G. Lindsay of Cleveland, is owned by the S. W. Transit Co., Charles T. Williams, manager, and not the South Western Trans. Co. as it appeared in these columns a couple of weeks ago.

Col. Jared A. Smith, United States engineer at Cleveland, advertises elsewhere in this issue for bids on extensive breakwater and pier works at Ashtabula harbor and Lorain harbor, both on Lake Erie. Bids will be opened on the 16th inst.

In the enforcement of St. Mary's river navigation rules this season three men of the revenue cutter service will be stationed at Sailors' Encampment, three at the dyke and three at what is known as the island cut, and a watch will be maintained day and night.

W. L. Scott & Co. of Erie, fearing that they might encounter great difficulty in moving coal to Chicago during the coming season, have chartered outright the steamers Black Rock, Niagara and Ketchum. It is understood that they paid $42,000 net for the Black Rock and $50,000 net for the Niagara.

Mr. W. J. Wilson, principal of the Chicago Nautical School, Masonic Temple, Chicago, gives out the following names of winners of the Great Lakes Register prizes: Capt. John Crangle, first prize; Mate J. F. Johnson, first prize; Mate F. N. Tucker, second prize; Mate J. D. Hallahan, third prize; Mate O. Larson, fourth prize.

Congressman Burton has secured in the house passage of a bill transferring the gas buoy now on Lansing shoal, Lake Michigan, to Simmons' reef and authorizing the removal of the light-ship at the latter place to Lansing shoal. The measure will undoubtedly be hurried through the senate before the opening of navigation.

Valentine Fries, who died at his home near Milan, O., on Monday last was an extensive vessel owner and had built vessels on the Huron river that were known in all parts of the lakes. Among them were the famous Edward-Golden Age tow of wooden vessels. Mr. Fries was a man of progress, always looking to the future.

It is understood that the Maythams, operating at Buffalo a tug line in opposition to the consolidation, now have a fleet of fifteen or sixteen tugs. They have been quietly buying everything in the way of a harbor tug that they could secure around the lakes and planning for determined opposition to the consolidation on the opening of navigation.

Rear Admiral Hichborn, chief of the bureau of construction and repair, will leave for San Francisco in a few days to inspect the shipbuilding at that point and to investigate the needs of the Mare Island navy yard.

HIGH PRAISE FOR METALLIC PACKING.

Metallic packing of the best quality is certainly coming into great favor on shipboard, especially where high pressures are used. Note the following letter, written from San Francisco under date of March 1 to the United States Metallic Packing Co. of Philadelphia by Chief Engineer Arthur G. Rose of the United States army transport Thomas, and which was signed also by W. H. Phillips and Robert Dempster, first and second engineers respectively of the Thomas:

"Yours of Nov. 16 inquiring about your packings received in Manila. I thought it best to reply after arrival at San Francisco and completing 22,000 miles, forty-eight actual steaming days. The following is the least that I can say and you are at liberty to make such use as you please with it: 'We left New York Nov. 4 for Manila and touched in ports only for coal; arrived at Manila Dec. 23. In Manila we examined packings (clearance) and found them scarcely worn. All were replaced as they were and up to the present time we have no trouble with hot or leaking piston rods or valve stems, and less swabbing and oil have been required.'"

HEAVY CONTRACT FOR BOILER TUBES.

Rear Admiral Melville, chief of the bureau of steam engineering, has just awarded a contract to the National Tube Works to supply the government with 70,000 boiler tubes to cost $165,000, and to be delivered within ninety days. The contract is remarkable in that it is understood that the successful concern will have to secure the assistance of some of its competitors to fill it in time. The tubes are necessary to repair the boilers of the Asiatic fleet at Manila.

Benjamin F. Perkins, grand captain's clerk of the American Association of Masters and Pilots of steam vessels, has been making a tour of the lake lodges during the past few weeks. He says he has found everything in satisfactory condition, though he was unable to go beyond Toledo during his present trip.

It is reported that Col. Charles Bird will select the transport Logan to represent the transport service of the United States at the Paris exposition. The Logan was built in 1892 and is 504 feet in length over all, with a beam of 62 feet; she draws 27 feet. She has two sets of triple expansion engines and twin screws.

The house committee on naval affairs has approved the naval appropriation bill and directed its report to the house. The bill carries approximately $61,000,000. Its general features have already been outlined.

The Godfrey Marine ways of Clinton, Ia., is building an excursion boat 125 feet long, 24 foot beam, for Amasa Hutchins of Rockford, Ill.

NEW BOOKLETS.

The Chicago, Milwaukee & St. Paul Railway is issuing a series of booklets regarding points of interest along its lines, and if you are interested in the western country, or contemplate a trip, write George H. Heafford, general passenger agent, Chicago, for the special publication desired, enclosing four cents in stamps for postage for each one.

No. 1. The Pioneer Limited.
No. 2. The Land of Bread and Butter.
No. 3. The Fox Lake Country.
No. 4. Fishing in the Great North Woods.
No. 5. The Lake Superior Country.
No. 6. Cape Nome Gold Diggings.
No. 8. Summer Days in the Lake Country.
No. 9. Summer Homes, 1900.
No. 11. The Game of Skat.
No. 12. Milwaukee—The Convention City.
No. 13. A Farm in the Timber Country.
No. 14. Stock Raising in the Sunshine State.
No. 15. Hunting and Fishing. April 12.

The Nickel Plate road offers to the traveling public a great convenience by the sale of the Central Passenger Association mileage ticket, which, besides the Nickel Plate, is honored for passage on thirty-six other roads. Apply to any agent. 48, Apr. 5.

VESSEL AND INSURANCE AGENTS.

C. W. ELPHICKE & CO.
Vessel and Insurance Agents,

Room 10, No. 6 Sherman St.,
W. ELPHICKE.
CALVIN CARR. CHICAGO, ILL.
Long Distance Telephone, Harrison 1194.

JOHN MITCHELL. JOHN F. WEDOW. ALFRED MITCHELL.

MITCHELL & CO.
Vessel and Insurance Agents,

508, 509 & 510 Perry-Payne Building, Cleveland, O.
Office Telephone 767. Residence, John Mitchell, Doan 341.
John F. Wedow, 158 L. Alfred Mitchell, Doan 197 J.

F. H. OSBORN & CO.
Marine Insurance Brokers,

12 SHERMAN ST., CHICAGO.
Long Distance Telephone, Harrison 1586.

W. C. RICHARDSON,
VESSEL AND MARINE INSURANCE AGENT,

Office Telephone 338. Residence Telephone 2938.
606 and 607 Perry-Payne Bldg., Cleveland, O.

BROWN & CO.
J. J. H. BROWN.
J. B. RODGERS.
EDWARD SMITH.

Vessel and Insurance Agents,

202 Main Street, Buffalo, N. Y.

H. J. PAULY,
General Ship Broker,

59 Chamber of Commerce, MILWAUKEE, WIS.
Telephone Main 369.

J. G. KEITH. D. SULLIVAN.

J. G. KEITH & CO.
Vessel and Insurance Agents,

138-139 Rialto Building, CHICAGO.
Long Distance Telephone, Harrison, 1339.

ALBERT GIBBS. Telephone Main 142, CARL C. JOYS.

GIBBS & JOYS,
Successors to R. P. Fitzgerald & Co.

SURVEYORS AND ADJUSTERS. **VESSEL AGENTS.** FIRE, MARINE, OCEAN AND LIABILITY INSURANCE.

No. 11 CHAMBER OF COMMERCE, MILWAUKEE.

JOHN B HALL. HARRY B. ROOT.

HALL & ROOT,
Vessel Agents,

21-22 Exchange Building,
202 MAIN STREET,
Telephone Seneca 892. BUFFALO, N. Y.

M. M. DRAKE. G. W. MAYTHAM.

DRAKE & MAYTHAM,
VESSEL AGENTS.

202 Main Street, BUFFALO, N. Y.
Telephone, Seneca 1660.

HUTCHINSON & CO.
Vessel and Insurance Agents.

Office Telephone, Main 2453.
Residence C. L. Hutchinson, W. 647 L.
Residence W. H. McGean, E. 1981.

C. L. HUTCHINSON
W. H. McGEAN. 413-15 Perry-Payne Bldg., CLEVELAND, O.

J. H. BARTOW.
Vessel and Insurance Agent

5 4-516 Perry-Payne Building, Cleveland, O.
TELEPHONE 717.

THOS. W LSON, Managing Owner
Wilson's Transit Line.

Gen Forwarder, Freight and Vessel Agent,
CLEVELAND, O.

VESSEL AND INSURANCE AGENTS.

SAMUEL HOLMES,
Steamship Offices,

For Selling, Chartering and Building all classes Steam Vessels.
Steam Vessel Circulars. Weekly Freight Circulars.
Morris Building, 66 & 68 Broad Street, NEW YORK.

MILLER, BULL & KNOWLTON,
Vessel Owners and Steamship Agents,

32 Broadway, NEW YORK.
Agents New York & Porto Rico Steamship Company.

JOHN J. BOLAND,
Vessel and Insurance Agent,

BUFFALO, N. Y.
25 and 26 Exchange Bldg., 202 Main Street,
Telephone Seneca 115.

JAMES A. MYERS,
Insurance and Vessel Agent

Room 201, Royal Insurance Bldg., CHICAGO.
Long Distance Telephone, Harrison 107.

W. A. HAWGOOD. J. W. MOORE.

HAWGOOD & MOORE,
Vessel and Insurance Agents,

Residence Phone, Doan 446—W. A. Hawgood.
Long Distance Tel. 2395.
608 Perry-Payne Building, CLEVELAND, O.

W. J. CONNERS,
OFFICES— BUFFALO, CHICAGO, MILWAUKEE GLADSTONE

Contractor,

BUFFALO, N. Y.

PROCTORS IN ADMIRALTY.

HOYT, DUSTIN & KELLEY,
LAWYERS and PROCTORS IN ADMIRALTY,

Offices, 702 Western Reserve Bldg., Cleveland, O.

White, Johnson, McCaslin & Cannon,
ATTORNEYS AT LAW and PROCTORS IN ADMIRALTY,

Blackstone Bldg., Cleveland O.

HARVEY D. GOULDER,
Lawyer and Proctor in Admiralty,

CLEVELAND, O.

ALBERT J. GILCHRIST,
PROCTOR IN ADMIRALTY,

604 Perry-Payne Building, CLEVELAND, O.

SAMUEL H. CROWL,
Attorney at Law and Proctor in Admiralty,

505 American Trust Building,
Phone Main 3579. CLEVELAND.

ORESTES C. PINNEY,
Lawyer and Proctor in Admiralty,

Rooms 316 and 317 Perry-Payne Building,
Telephone Main 2585. CLEVELAND, O.

PATENTS.

E. L. THURSTON. ALBERT H. BATES.

THURSTON & BATES,
Counselors at Law in Patent Causes and Solicitors of Patents,

1028 Society for Savings Bldg., CLEVELAND, O.

PROFESSIONAL.

W. J. WOOD,
Naval Architect, Ship Surveyor,
Consulting Engineer.

Prepares designs or working drawings and specifications for all classes of vessels and superintends construction and repairs. Surveys damaged property and estimates cost of repairs.

Vessels designed—Twin S. S. Virginia, Steam Yacht Comanche, Twin S. S. North West and North Land, I. W. Nicholas, and many others, including Fire Boats, Tugs, Barges, etc.

Complete plans furnished for Steel Composite or Wooden Vessels.

Office on Goodrich Dock, foot of Michigan Ave., CHICAGO, ILL.

Pittsburgh Testing Laboratory, Limited,
INSPECTING AND METALLURGICAL ENGINEERS AND CHEMISTS,

1750 MONADNOCK, CHICAGO. 325 WATER STREET, PITTSBURGH.
18 SOUTH BROAD ST. PHILADELPHIA.

Inspectors of Shipbuilding Materials and Machinery.
Inspectors located at all mills, Physical and Chemical Laboratories.
Tests of all kinds.

ROBERT W. HUNT & CO.
BUREAU OF INSPECTION, TESTS AND CONSULTATION.

1121 THE ROOKERY, CHICAGO. MONGH. BANK BLDG., PITTSBURGH. 71 BROADWAY, NEW YORK.

Inspectors of Shipbuilding Material and Machinery. Inspectors of all Materials. Duty Tests of Engines and Boilers. Physical and Chemical Laboratories.

HORACE SEE,
Consulting Engineer and Naval Architect,

1 Broadway, NEW YORK.

GUSTAV HILLMANN,
NAVAL ARCHITECT.

Designer of all classes of VESSELS.

470 Greene Ave., near Norstrand, Brooklyn, N. Y.

JOSEPH R. OLDHAM,
Engineer and Naval Architect.

Designs Steam Vessels, Marine Engines and Boilers, and Superintends their Construction or Repairs.

814 Perry-Payne Building, CLEVELAND, O.
Telephone, Doan 440, J.

ROBERT CURR,
CONSULTING SHIP BUILDER and MARINE SURVEYOR,

56 Wade Building, CLEVELAND, O.
Telephone Main 2844. Residence, 32 Malcom Street.
Residence Telephone, W. 628 Y.

AMBROSE V. POWELL, C.E.
Consulting Engineer.

SPECIALTIES:—Designing and Construction of DRY DOCKS, Harbor Works, Docks and Plants for Handling Coal and Ore.

Office, 615 Chamber of Commerce, CHICAGO, ILL.

HERBERT WRIGHT & CO.,
No. 215, 216, 217, 218 and 219
PERRY-PAYNE BUILDING.
Telephones Main 2754, 2770 and 3541.

Up-town Office.
No. 811 NEW ENGLAND BUILDING.
Telephone Main 1273.

Every possible facility for conducting a brokerage business in

STOCKS, BONDS, GRAIN, ETC.

U. S. Engineer Office, 1637 Indiana Ave., Chicago., Ill., March 21, 1900. Sealed proposals for manufacture and erection of superstructure for double track Railroad Bridge across Illinois and Mississippi Canal near Wyanet, Ill., will be received here until 12 noon, April 10, 1900, and then publicly opened. Information furnished on application. J. H. Willard, Major, Engrs. Apr. 5.

U. S. Engineer Office, 185 Euclid Ave., Cleveland, O., March, 17, 1900. Sealed proposals for constructing east and west breakwaters at Ashtabula Harbor, Ohio, will be received here until 2 P. M., standard time, Monday, April 16, 1900, and then publicly opened. Information on application. Jared A. Smith, Col., Engrs. April 12

U. S. Engineer Office, 185 Euclid Ave., Cleveland, O., March, 17, 1900. Sealed proposals for constructing breakwaters and piers at Black River Harbor (Lorain), Ohio, will be received here until 2 P. M., standard time, Monday, April 16, 1900, and then publicly opened. Information on application. Jared A. Smith, Col., Engrs. April 12

U. S. Engineer Office, 1637 Indiana Ave., Chicago, Ill., March 15, 1900. Sealed proposals for constructing foundations for four arch culverts and for constructing fourteen pipe culverts under Illinois and Mississippi Canal and for other work and material of same character will be received here until 12, noon, April 16, 1900, and then publicly opened. Information furnished on application here or to Assistant Engineer L. L. Wheeler, Rock Falls, Ill. J. H. Willard, Maj., Engrs. April 5

BUYERS' DIRECTORY OF THE MARINE TRADE.

For a more complete classification than that represented by advertisers in the Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, marine and naval directory of the United States, published by the Marine Review Pub. Co., 418-419 Perry-Payne Bldg., Cleveland.

See accompanying Index of Advertisers for full addresses of concerns in this directory.

AIR COMPRESSORS, AIR HOISTS, ETC.

Chicago Pneumatic Tool Co.....Chicago.
Ingersoll-Sergeant Drill Co.....New York.
Manning, Maxwell & Moore.....New York.
Philadelphia Pneumatic Tool Co.....Philadelphia.

ANCHORS.

Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.

ANTI-FRICTION METALS.

Ajax Metal Co.....Philadelphia.
Cramp, Wm. & Sons.....Philadelphia.
Illinois Smelting & Refining Works.....Chicago.
Magnolia Metal Co.....New York.
Phosphor Bronze Smelting Co., Ltd....Philadelphia.

ARTIFICIAL DRAFT FOR BOILERS.

American Ship Building Co.....Cleveland.
Bloomsburg & Co., H.....Newport News, Va.
Buffalo Forge Co.....Buffalo.
Detroit Shipbuilding Co.....Detroit.
Sprague Electric Co.....New York.
Sturtevant, B. F. Co.....Boston.

ATTORNEYS AND PROCTORS IN ADMIRALTY.

Crowl, Samuel H.....Cleveland.
Gilchrist, Albert J.....Cleveland.
Goulder, Harvey D.....Cleveland.
Hoyt, Dustin & Kelley.....Cleveland.
Pinney, Orestes C.....Cleveland.
White, Johnson, McCaslin & Cannon.....Cleveland.

AXLES, SOLID AND HOLLOW.

Bethlehem Steel Co.....So. Bethlehem, Pa.

BABBITT METAL.

Ajax Metal Co.....Philadelphia.
Cramp, Wm. & Sons.....Philadelphia.
Illinois Smelting & Refining Works.....Chicago.
Magnolia Metal Co.....New York.
Phosphor Bronze Smelting Co., Ltd....Philadelphia.

BAROMETERS, MARINE GLASSES, ETC.

Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.
Also most of the ship chandlers.

BENDING AND STRAIGHTENING ROLLS.

Cleveland Punch & Shear Works Co.....Cleveland.
Long & Allstatter Co.....Hamilton, O.
New Doty Mfg. Co.....Janesville, Wis.

BLOCKS, SHEAVES, ETC.

Boston & Lockport Block Co.....Boston, Mass.
Cleveland Block Co.....Cleveland.
Donohue & Co., John T.....Baltimore.

BLOWERS.

Buffalo Forge Co.....Buffalo.
Sprague Electric Co.....New York.
Sturtevant, B. F. Co.....Boston.

BOAT BUILDERS.

Drein, Thos. & Son.....Wilmington, Del.
Electric Boat Co.....New York.
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated.....New York.
Lane & DeGroot.....Brooklyn.

BOILER MANUFACTURERS.

Almy Water Tube Boiler Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Babcock & Wilcox Co.....New York.
Bath Iron Works, Ltd.....Bath, Me.
Boyer Water Tube Boiler Co.....New York.
Chicago Ship Building Co.....Chicago.
Cramp, Wm. & Sons.....Philadelphia.
Dearing Water Tube Boiler Co.....Detroit.
Delaunay, Belleville & Co.....St. Denis, France.
Detroit Screw Works.....Detroit.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Engine Co.....Weymouth, Mass.
Gas Engine & Power Co.....Morris Heights, N. Y.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Iowa Iron Works.....Dubuque, Ia.
Jenks Ship Building Co.....Port Huron, Mich.
Kingsford Found'y & Machine Works.Oswego, N. Y.
MacKinnon Mfg. Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Morse Iron Works & Dry Dock Co.....Brooklyn.
Neafie & Levy Ship & Eng. Bldg. Co..Philadelphia.
Newport News Ship Bldg. Co...Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Roberts Safety Water Tube Boiler Co....New York.
Stirling, The Co.....Chicago.
Trigg, Wm. R. Co.....Richmond, Va.
Union Iron Works.....San Francisco.
Watson, Egbert P.....Elizabeth, N. J.
Wolff & Zwicker Iron Works.....Portland, Ore.

BOILER COMPOUNDS.

Dearborn Drug & Chemical Works.....Chicago.

BOILER COMPOUND FEEDER.

Hall Compound Feeder Co.....Chicago.

BOILER TUBES, SEAMLESS, WELDLESS—Steel, Brass and Copper.

Atlantic Tube Co.....Pittsburg.
Hungerford Brass & Copper Co.....New York.
Shelby Steel Tube Co.....Cleveland.

BOILER FURNACES, FIRE FRONTS, ETC.

Continental Iron Works.....New York.

BOILER STAYBOLT IRON.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

BOLT CUTTERS.

American Tool Works Co. (The).....Cincinnati.
Manning, Maxwell & Moore.....New York.

BORING AND TURNING MILLS.

American Tool Works Co. (The).....Cincinnati
Bement, Miles & Co.....Philadelphia.
Manning, Maxwell & Moore.....New York.

BRASS AND BRONZE CASTINGS, SHEETS, RODS, ETC.

Ajax Metal Co.....Philadelphia.
Cory, Chas. & Son.....New York.
Cramp, Wm. & Sons.....Philadelphia.
Illinois Smelting & Refining Works.....Chicago.
Magnolia Metal Co.....New York.

BRIDGES, BUILDERS OF.

Berlin Iron Bridge Co.....East Berlin, Conn.
Scherzer Rolling Lift Bridge Co.....Chicago.

BUCKETS, ORE AND COAL.

Brown Hoisting & Conveying Mach. Co..Cleveland.
McMyler Mnfg. Co.....Cleveland.
Webster, Camp & Lane Machine Co.....Akron, O.

CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co.....Cleveland.

CAPSTANS.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

CHAINS.

Hayden, P., S. H. Co.....Columbus, O.
Lebanon Chain Works.....Lebanon, Pa.
Monongahela Iron & Steel Co. .....Pittsburg.

CHAIN HOISTS.

Boston & Lockport Block Co.....Boston, Mass.

CHRONOMETERS—SHIP CLOCKS.

Ashton Valve Co.....Boston.
Bliss, John & Co.....New York.
Chelsea Clock Co.....Boston.
Ritchie, E. S. & Sons.....Brookline, Mass.
Also most of the ship chandlers.

CHUCKING MACHINES.

American Tool Works Co. (The).....Cincinnati.
Manning, Maxwell & Moore.....New York.

CIRCULATOR EQUILIBRIUM, with Steam Heating Attachment.

Bloomsburg & Co., H.....Newport News, Va.

COAL PRODUCERS AND SHIPPERS.

Castner, Curran & Bullitt.....Philadelphia.
Hanna, M. A. & Co.....Cleveland.
Osborne, Saeger & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.
Pittsburgh & Chicago Gas Coal Co.....Cleveland.
Rochester & Pittsburgh Coal & Iron Co....Buffalo.
Youghiogheny & Lehigh Coal Co.....Chicago.

COAL AND ORE HANDLING MACHINERY.

Brown Hoisting & Conveying Mach. Co..Cleveland.
Lidgerwood Mnfg. Co.....New York.
McMyler Mnfg. Co.....Cleveland.
Webster, Camp & Lane Machine Co.....Akron, O.

COMPASSES.

Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

COMPASS ADJUSTER.

Simpson, Geo. A.....Sault Ste. Marie, Mich.

CONDENSERS.

See pumps, valves, steam specialties, &c.

COPPER AND SHEET IRON WORK.

Pusey & Jones Co.....Wilmington, Del.

CORDAGE.

American Mnfg. Co.....New York.
See also ship chandlers.

CORK JACKETS AND RINGS.

Armstrong Cork Co.....Pittsburgh, Pa.
Kahnweiler's Sons, D.....New York.
Lane & DeGroot.....Brooklyn.

CRANES, CONVEYORS, HOISTS.

Brown Hoisting & Conveying Mach. Co..Cleveland.
Donohue & Co., John T.....Baltimore
General Electric Co.....Schenectady, N. Y.
Lidgerwood Mnfg. Co.....New York.
Manning, Maxwell & Moore.....New York.
McMyler Mnfg. Co.....Cleveland.
Sprague Electric Co.....New York.
Webster, Camp & Lane Machine Co.....Akron, O.
Westinghouse Electric & Mnfg. Co. .....Pittsburg.

CRANK PINS.

Bethlehem Steel Co.....Bethlehem, So. Pa.

DECK PLANING MACHINERY.

Dallett, Thos. H. & Co.....Philadelphia.

DECK SEAMS, COMPOSITION FOR.

Cole & Kuhls.....Brooklyn, N. Y.

DRILLS—ROCK DRILLS, COAL CUTTERS, ETC.

Ingersoll-Sergeant Drill Co.....New York.

DRILLS, PNEUMATIC.

Chicago Pneumatic Tool Co.....Chicago.
Q. & C. Co.....Chicago.

DRILL PRESSES—DRILLS OF ALL KINDS.

American Tool Works Co. (The).....Cincinnati.
Bement, Miles & Co.....Philadelphia.
Cleveland Punch & Shear Works Co.....Cleveland.
Manning, Maxwell & Moore.....New York.

DRYING APPARATUS.

Sturtevant Co., B. F.....Boston.

DRY DOCKS.

American Ship Building Co.....Cleveland.
Bath Iron Works, Ltd.....Bath, Me.
Chicago Ship Building Co.....Chicago.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Harlan & Hollingsworth Co.....Wilmington, Del.
McWilliams, Frank.....1 Broadway, New York.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Morse Iron Works & Dry Dock Co.....Brooklyn.
Newport News Ship Bldg Co....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Townsend & Downey Ship Bldg. Co.....New York.
Union Dry Dock Co.....Buffalo.
Union Iron Works.....San Francisco.

ELEVATORS.

Morse, Williams & Co.....Philadelphia.

ELECTRIC LIGHT AND POWER PLANTS.

Buffalo Forge Co.....Buffalo.
General Electric Co.....Schenectady, N. Y.
Sprague Electric Co.....New York.
Sturtevant, B. F. Co.....Boston.
Westinghouse Electric & Mnfg. Co..Pittsburgh, Pa.

ELECTRIC HOISTS AND CRANES.

General Electric Co.....Schenectady, N. Y.
Lidgerwood Mnfg. Co.....New York.
Manning, Maxwell & Moore.....New York.
Sprague Electric Co.....New York.
Westinghouse Electric & Mnfg. Co...Pittsburg, Pa.

ENGINE BUILDERS, MARINE.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Chicago Ship Building Co.....Chicago.
Chase Machine Co.....Cleveland.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Engine Co.....Weymouth, Mass.
Gas Engine & Power Co., and Chas. L. Seabury & Co., Consolidated.....New York.
Giddings & Stevens.....Rockford, Ill.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Iowa Iron Works.....Dubuque, Ia.
Jenks Ship Building Co.....Port Huron, Mich.
MacKinnon Mfg. Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Morse Iron Works & Dry Dock Co.....Brooklyn.
Neafie & Levy Ship & Eng. Bldg Co..Philadelphia.
Newport News Ship Bldg Co..Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Roach's Ship Yard.....Chester, Pa.
Sheriffs Mnfg. Co.....Milwaukee.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G.....Buffalo.
Union Iron Works.....San Francisco.
Wolff & Zwicker Iron Works.....Portland, Ore.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son.....New York.

ENGINEERS, MARINE AND MECHANICAL.

Giddings & Stevens.....Rockford, Ill.
Hillman, Gustav.....Brooklyn.
Hunt, Robt. W. & Co.....Chicago.
Miller, Walter.....Cleveland.
Oldham, Joseph R.....Cleveland.
Pittsburgh Testing Laboratory, Ltd.....Pittsburgh.
Powell, Ambrose V.....Chicago.
See, Horace.....New York.
Wood, W. J.....Chicago.

FANS FOR VENTILATION, EXHAUST, ETC.

Buffalo Forge Co.....Buffalo.
Sprague Electric Co.....New York.
Sturtevant, B. F. Co.....Boston.

FEED WATER PURIFIERS AND HEATERS.

Learmonth, Robert.....Buffalo.

FORGES.

Buffalo Forge Co.....Buffalo.
Sturtevant Co., B. F.....Boston.

FORGINGS, IRON AND STEEL.

Bethlehem Steel Co.....South Bethlehem.
Bourne-Fuller Co.....Cleveland.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

FIXTURES FOR LAMPS, OIL AND ELECTRIC.
Page Bros. & Co.....Boston.

FLUSHOMETERS.
Kenney, The Co.....New York.

FUELING COMPANIES AND COAL DEALERS.
Castner, Curran & Bullitt (Pocahontas)..... Philadelphia.
Graham, James & Co.....Detroit.
Hanna, M. A. & Co.....Cleveland.
Hanlon, Mark H.....Cleveland.
Osborne, Saeger & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.
Port Royal Dock Co.....Sault Ste. Marie, Mich.
Pittsburgh & Chicago Gas Coal Co.....Cleveland.
Rochester & Pittsburgh Coal & Iron Co..Buffalo.
Smith, Stanley B. & Co.....Detroit.
Youghiogheny & Lehigh Coal Co.....Chicago.

FURNACES FOR BOILERS.
Continental Iron Works.....New York.

GAS BUOYS.
Safety Car Heating & Lighting Co.....New York.

GAS AND GASOLINE ENGINES.
Chicago Water Motor & Fan Co.....Chicago.
Giddings & Stevens.....Rockford, Ill.
McMyler Mnfg. Co.....Cleveland.
Olds Motor Works.....Detroit.

GAGES, STEAM AND VACUUM.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.
Manning, Maxwell & Moore.....New York.
See also valves and steam specialties.

GRAPHITE.
Dixon Crucible Co., Joseph.....Jersey City, N. J.

HAMMERS, PNEUMATIC.
Chicago Pneumatic Tool Co.....Chicago.
Philadelphia Pneumatic Tool Co.....Philadelphia.
Q. & C. Co.....Chicago.

HAMMERS, POWER DROP.
Bement, Miles & Co.....Philadelphia.
Chase Machine Co.....Cleveland.

HEATING APPARATUS.
Sturtevant Co., B. F.....Boston.

HOISTING ENGINES.
American Ship Building Co.....Cleveland.
Brown Hoisting & Conveying Mach. Co..Cleveland.
Chase Machine Co.....Cleveland.
Donohue & Co., John T.....Baltimore.
General Electric Co.....New York.
Hodge, S. F. & Co.....Detroit.
Hyde Windlass Co.....Bath, Me.
Lidgerwood Mnfg. Co.....New York.
Manning, Maxwell & Moore.....New York.
McMyler Mnfg. Co.....Cleveland.
Marine Iron Co.....Bay City.
Sprague Electric Co.....New York.
Williamson Bros.....Philadelphia.
Westinghouse Electric & Mnfg. Co.....Pittsburg.

HOSE—AIR.
Chicago Pneumatic Tool Co.....Chicago.
Manning, Maxwell & Moore.....New York.
Philadelphia Pneumatic Tool Co.....Philadelphia.

INDICATORS FOR STEAM ENGINES.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Ashcroft Mnfg. Co.....New York.
Crosby Steam Gage & Valve Co.....Boston.

INJECTORS.
Jenkins Bros.....New York.
Hayden & Derby Mnfg. Co.....New York.
Penberthy Injector Co.....Detroit.

INSURANCE, MARINE.
Bartow, J. H.....Cleveland.
Brown & Co.....Buffalo.
Drake & Maytham.....Buffalo.
Elphicke, C. W. & Co.....Chicago.
Gibbs & Joys.....Milwaukee.
Hawgood & Moore.....Cleveland.
Hutchinson & Co.....Cleveland.
Keith, J. G. & Co.....Chicago.
La Salle & Co.....Duluth.
Mitchell & Co.....Cleveland.
Myers, James A.....Chicago.
Osborn & Co., F. H.....Chicago.
Pauly, H. J.....Milwaukee.
Parker & Millen.....Detroit.
Peck, Chas. E. & W. F.....New York and Chicago.
Richardson, W. C.....Cleveland.

IRON ORE AND PIG IRON.
Bourne-Fuller Co.....Cleveland.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.

LATHES OF ALL KINDS.
American Tool Works Co. (The).....Cincinnati.
Bement, Miles & Co.....Philadelphia.
Manning, Maxwell & Moore.....New York.

LAUNCHES—NAPHTHA, ELECTRIC.
Electric Boat Co.....New York.
Gas Engine & Power Co.....New York.

LIFE BOATS—METALLIC.
Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, D.....New York.

LIFE PRESERVERS, LIFE BOATS, BUOYS, RAFTS, ETC.
Armstrong Cork Co.....Pittsburg.
Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, D.....New York.
Lane & DeGroot.....Brooklyn.

LIGHTS, SIDE AND SIGNAL.
Page Bros. & Co.....Boston.

LUBRICATING PUMPS.
Manzel Bros.....Buffalo.
Phenix Metallic Packing Co.....Chicago.
Sterling Lubricator Co.....Rochester, N. Y.

MACHINE TOOLS.
American Tool Works Co. (The).....Cincinnati.
Bement, Miles & Co.....Philadelphia.
Manning, Maxwell & Moore.....New York.

MATTRESSES, CUSHIONS, BEDDING.
Fogg, M. W.....New York.
Mechanical Fabric Co.....Providence, R. I.

METALLIC PACKING.
Katzenstein, L. & Co.....New York.
Phenix Metallic Packing Co.....Chicago.
U. S. Metallic Packing Co.....Philadelphia.

METALS FOR BEARINGS.
Ajax Metal Co.....Philadelphia.
Cramp, Wm. & Sons.....Philadelphia.
Illinois Smelting & Refining Works.....Chicago.
Magnolia Metal Co.....New York.
Phosphor Bronze Smelting Co., Ltd...Philadelphia.

METAL POLISH.
Bertram's Oil Polish Co.....Boston, Mass.

MILLING MACHINES OF ALL KINDS.
American Tool Works Co. (The).....Cincinnati.
Bement, Miles & Co.....Philadelphia.
Manning, Maxwell & Moore.....New York.

NAUTICAL INSTRUMENTS.
Bliss, John & Co.....New York.
Ritchie & Sons, E. S.....Brookline, Mass.
Also most of the ship chandlers.

NAVAL ARCHITECTS.
Curr, Robert.....Cleveland.
Hillman, Gustav.....Brooklyn.
Kirby, Frank E.....Detroit.
Oldham, Joseph R.....Cleveland.
See, Horace.....New York.
Wood, W. J.....Chicago.

NICKEL STEEL FORGINGS.
Bethlehem Steel Co.....So. Bethlehem, Pa.

OAK, TIMBER AND PLANK.
Martin-Barriss Co.....Cleveland.

OILS AND LUBRICANTS.
Dixon Crucible Co., Jos.....Jersey City, N. J.
Standard Oil Co.....Cleveland.

PACKING.
Jenkins Bros.....New York.
Katzenstein, L. & Co.....New York.
Phenix Metallic Packing Co.....Chicago.
U. S. Metallic Packing Co.....Philadelphia.

PAINTS.
Baker, Howard H. & Co.....Buffalo.
Smith, Edward & Co.....New York.
Upson-Walton Co.....Cleveland.

PAINTING MACHINES, PNEUMATIC.
Chicago Pneumatic Tool Co.....Chicago.

PATENT ATTORNEYS.
Thurston & Bates.....Cleveland.

PIPE, WROUGHT IRON.
Bourne-Fuller Co.....Cleveland.

PLANERS OF ALL KINDS.
American Tool Works Co. (The).....Cincinnati.
Bement, Miles & Co.....Philadelphia.
Manning, Maxwell & Moore.....New York.

PLUMBING, MARINE.
Ellis Marine Plumbing Co.....New York.
Mott Iron Works, J. L.....New York.
Sands, Alfred B. & Son.....New York.
Kenney, The Co.....New York.

PNEUMATIC TOOLS.
Chicago Pneumatic Tool Co.....Chicago
Manning, Maxwell & Moore.....New York.
Philadelphia Pneumatic Tool Co.....Philadelphia.
Q. & C. Co.....Chicago.

POCAHONTAS COAL.
Castner, Curran & Bullitt.....Philadelphia

POLISH FOR METALS.
Bertram's Oil Polish Co.....Boston, Mass

PROPELLER WHEELS.
American Ship Building Co.....Cleveland
Atlantic Works.....East Boston, Mass.
Bath Iron Works Ltd.....Bath, Me
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo
Fore River Engine Co.....Weymouth, Mass
Hyde Windlass Co.....Bath Me.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
MacKinnon Mfg Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Morse Iron Works & Dry Dock Co.....Brooklyn.
Neafie & Levy Ship & Eng. Bldg Co...Philadelphia.
Newport News Ship Bldg. Co..Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Phosphor Bronze Smelting Co., Ltd...Philadelphia.
Pusey & Jones Co.....Wilmington, Del.
Sheriffs Mnfg. Co.....Milwaukee.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G.....Buffalo.
Union Iron Works.....San Francisco.
Wolff & Zwicker Iron Works.....Portland, Ore.

PROJECTORS, ELECTRIC.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Sprague Electric Co.....New York.
Westinghouse Electric & Mnfg. Co...Pittsburg, Pa.

PUMPS FOR VARIOUS PURPOSES.
Blake, Geo. F. Mnfg. Co.....New York.
Davidson, M. T.....Brooklyn, N. Y.
Donohue & Co., John T.....Baltimore.
Kingsford Foundry & Machine Works.....Oswego, N. Y.
Van Duzen, The E. W. Co.....Cincinnati.
Worthington, Henry R.....New York.

PUNCHES, RIVETERS, SHEARS.
American Tool Works Co. (The).....Cincinnati.
Bement, Miles & Co.....Philadelphia.
Cleveland Punch & Shear Works Co.....Cleveland.
Long & Allstatter Co.....Cincinnati.
Manning, Maxwell & Moore.....New York.
New Doty Mnfg. Co.....Janesville, Wis.
Philadelphia Pneumatic Tool Co.....Philadelphia.
Wood & Co., R. D.....Philadelphia.

REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes Register.....Chicago.

RELEASING HOOKS FOR DETACHING BOATS.
Standard Aut. Releasing Hook Co.....New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.
Bourne-Fuller Co.....Cleveland.

ROPE.
American Mnfg. Co.....New York.
See also ship chandlers.

RUBBER INSULATED WIRES.
Roebling's Sons, John A..New York and Cleveland.

SAFETY VALVES.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Consolidated Safety Valve Co.....New York.
Crosby Steam Gage & Valve Co.....Boston.

SAIL MAKERS.
Baker, Howard H. & Co.....Buffalo.
Upson-Walton Co.....Cleveland.
Wilson & Silsby.....Boston.

SALVAGE COMPANIES.
See wrecking companies.

SCREW MACHINES.
American Tool Works Co. (The).....Cincinnati.
Bement, Miles & Co.....Philadelphia.
Manning, Maxwell & Moore.....New York.

SEARCH LIGHTS.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Sprague Electric Co.....New York.
Westinghouse Electric & Mnfg. Co...Pittsburg, Pa.

SEPARATORS, (CENTRIFUGAL).
Keystone Engine & Machine Works..Philadelphia.

SHAPERS.
American Tool Works Co. (The).....Cincinnati.
Manning, Maxwell & Moore.....New York.

SHEARS.
See punches, riveters and shears.

SHEAVES, BALL BEARING.
Donohue & Co., John T.....Baltimore.

SHIP AND BOILER PLATES AND SHAPES.
Bourne-Fuller Co.....Cleveland.

SHIP BUILDERS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Shipbuilding Co.....Detroit.
Fore River Engine Co.....Weymouth, Mass.
Harlan & Hollingsworth Co.....Wilmington, Del.
Iowa Iron Works.....Dubuque, Ia.
Jenks Ship Building Co.....Port Huron, Mich.
McWilliams, Frank.....1 Broadway, New York.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Morse Iron Works & Dry Dock Co.....Brooklyn.
Neafie & Levy Ship & Eng. Bldg. Co..Philadelphia.
Newport News Ship Bldg. Co...Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Roach's Ship Yard.....Chester, Pa.
Townsend & Downey Ship Bldg. Co.....New York.
Trigg, Wm. R. Co.....Richmond, Va.
Union Dry Dock Co.....Buffalo.
Union Iron Works.....San Francisco.
Wolff & Zwicker Iron Works.....Portland, Ore.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

SHIP CHANDLERS.
Baker, Howard H. & Co.....Buffalo.
Moran, Bros. Co.....Seattle, Wash.
Upson-Walton Co.....Cleveland.

SLING FRAME FOR HANDLING BARRELS.
Patriarche, H. R.....Milwaukee.

SPARS—LARGE SIZES.
Moran Bros. Co.....Seattle, Wash.

STAYBOLT IRON, HOLLOW AND SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAMSHIP LINES, PASS. AND FREIGHT.
American Line.....New York.
International Nav. Co.....Philadelphia.
Red Star Line.....New York.

STEAM VESSEL FOR SALE.
Holmes, Samuel.....New York.

STEEL SHAFTS, SOLID OR HOLLOW.
Bethlehem Steel Co.....So. Bethlehem, Pa.

STEERING APPARATUS.
American Ship Building Co.....Cleveland.
Chase Machine Co.....Cleveland.
Detroit Shipbuilding Co.....Detroit.
Donohue & Co., John T.....Baltimore.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Queen City Engineering Co.....Buffalo.
Sheriffs Mfg. Co.....Milwaukee.
Williamson Bros.....Philadelphia.

STOKERS FOR MARINE SERVICE.
American Stoker Co.....New York.

STOCKS, BONDS, SECURITIES.
Wright, Herbert & Co.....Cleveland.

STOCKLESS ANCHORS.
Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.

STRUCTURES OF STEEL, BUILDERS OF.
Berlin Iron Bridge Co.....East Berlin, Conn.

SURVEYORS, MARINE.
Curr, Robert.....Cleveland.
Gibbs & Joys.....Milwaukee.
Oldham, Joseph R.....Cleveland.

TELEGRAPH—DECK AND ENGINE ROOM.
Cory, Chas. & Son.....New York.

TESTS OF MATERIAL.
Hunt, Robert W. & Co.....Chicago.
Pittsburgh Testing Laboratory, Ltd.....Pittsburgh.

THRUST COLLARS FOR PROPELLER SHAFTS.
Ball Bearing Co.....Boston, Mass.

TIMBER—LARGE PIECES.
Moran Bros. Co.....Seattle, Wash.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.
American Tool Works Co. (The).....Cincinnati.
Bement, Miles & Co.....Philadelphia.
Chicago Pneumatic Tool Co.....Chicago.
Cleveland Punch & Shear Works Co. ...Cleveland.
Long & Allstatter, The Co.....Hamilton, O.
Manning, Maxwell & Moore.....New York.
New Doty Mnfg. Co.....Janesville, Wis.
Philadelphia Pneumatic Tool Co.....Philadelphia.
Q. & C. Co.....Chicago.
Wood & Co., R. D.....Philadelphia.

TRUCKS.
Boston & Lockport Block Co.....Boston, Mass.

TOWING MACHINES.
American Ship Windlass Co.....Providence, R. I.
Chase Machine Co.....Cleveland.

TOWING COMPANIES.
Donnelly Salvage & Wrecking Co...Kingston, Ont.
Swain Wrecking Co.....Detroit.

TUBING, STEEL, COPPER AND BRASS.
Atlantic Tube Co.....Pittsburg.
Hungerford Brass & Copper Co., U. T...New York.
Merchant & Co., Inc.....Philadelphia.
Shelby Steel Tube Co.....Cleveland.

VALVES, STEAM SPECIALTIES, ETC.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.
Jenkins Bros.....New York.
Manning, Maxwell & Moore.....New York.

VARNISH MAKERS, COLOR GRINDERS, ETC.
Smith, Edward & Co.....New York.

VARNISH PAINT.
Mair, John & Son.....Philadelphia.

VESSEL AND FREIGHT AGENTS.
Bartow, J. H.....Cleveland.
Boland, John J.....Buffalo.
Brown & Co.....Buffalo.
Drake & Maytham.....Buffalo.
Elphicke, C. W. & Co.....Chicago.
Gibbs & Joys.....Milwaukee.
Hall & Root.....Buffalo.
Hawgood & Moore.....Cleveland.
Holmes, Samuel.....New York.
Hutchinson & Co.....Cleveland.
Keith, J. G. & Co.....Chicago.
Miller, Bull & Knowlton.....New York.
Mitchell & Co.....Cleveland.
Myers, James A.....Chicago.
Pauly, H. J.....Milwaukee.
Richardson, W. C.....Cleveland.

VENTILATING APPARATUS FOR SHIPS.
Buffalo Forge Co.....Buffalo.
Sprague Electric Co.....New York.
Sturtevant Co., B. F.....Boston.

WIRE ROPE.
American Steel & Wire Co.....Chicago.
Baker, H. H. & Co.....Buffalo.
Roebling's Sons, John A..New York and Cleveland.
Upson-Walton Co.....Cleveland.

WHISTLES, STEAM.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

WINDLASSES.
American Ship Windlass Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.

WINCHES.
American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

WOOD WORKING MACHINERY.
Woods Machine Co., S. A.....So. Boston.

WORM GEARING.
Morse, Williams & Co.....Philadelphia.

WRECKING AND SALVAGE COMPANIES.
Donnelly Salvage & Wrecking Co...Kingston, Ont.
Playfair's Barge & Tug Line.....Midland, Ont.
Salvage Association of No. America.....Chicago.
Swain Wrecking Co.....Detroit.

YACHT SAILS, FITTINGS, HARDWARE, ETC.
Wilson & Silsby.....Boston.
See also ship chandlers.

YACHT AND BOAT BUILDERS.
Drein, Thos. & Son.....Wilmington, Del.
Electric Boat Co.....New York.
Gas Engine & Power Co.....New York.
Lane & DeGroot.....Brooklyn.

YAWLS.
Drein, Thos. & Son.....Wilmington, Del.
Lane & DeGroot.....Brooklyn.

ALPHABETICAL INDEX OF ADVERTISERS IN THE MARINE REVIEW.

The star (*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted.

LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CLEVELAND CITY TICKET OFFICE,
237 SUPERIOR STREET.

		Arrive from West.	Depart East.
	Eastward:—		
No.	18, Southwestern Limited.....	.....	*1 55 am
No.	22, Lake Shore Limited.....	*2 15 am	*2 20 am
No.	28, New York & Boston Exp..	*7 40 am	*8 00 am
No.	32, Fast Mail	*11 20 am	*11 25 am
No.	44, Accom. via Sandusky.....	†1 15 pm	.....
No.	46, Southwestern Express	.....	*3 00 pm
No.	6, Limited Fast Mail.....	*5 40 pm	*5 45 pm
No.	10, C., N. Y. & Boston Special	*7 35 pm	*7 40 pm
No.	2 Day Express	†9 10 pm	†9 35 pm
No.	126, Norwalk Accommodation..	†7 55 am	.....
No.	40, Tol. & Buff. Ac., v. Norw'k	†10 00 am	†10 30 am
No.	116, Conneaut Accommodation.	.....	†4 30 pm
		Arrive from East.	Depart West.
	Westward:—		
No.	11, Southwestern Limited.....	*3 20 am	.....
No.	15, N. Y., Bos. & Chi. Spl.....	*3 55 am	*4 05 am
No.	7, Day Express	.....	†6 30 am
No.	19, The Lake Shore Ltd.....	*7 45 am	*7 50 am
No.	23, Western Express	*11 10 am	*11 15 am
No.	33, Southwestern Express.....	*11 25 pm	.....
No.	31, United States Express.....	.....	*12 10 pm
No.	47, Accommodation	.....	†3 00 pm
No.	141, Sandusky Accommodation.	.....	†3 10 pm
No.	127, Norwalk Accommodation..	.....	†5 10 pm
No.	37, Pacific Express	*6 35 pm	*7 00 pm
No.	3, Fast Mail Limited.....	*10 50 pm	*10 55 pm

*Daily, †Daily except Sunday. ‡Daily except Monday.
Trains Nos. 28 and 37 run via Erie station.

WANTED, FOR SALE, FOR CHARTER, Etc.

—FOR SALE—Tug Henry. Wood hull, 60 feet length, 15 feet beam. Single engine, 16x18 inches. Boiler 10½ feet long, 78 inches diameter. C. H. Strong & Son, No. 623 Cuyahoga Bldg., Cleveland. April 12

WANTED—A light-draught steam barge or canal boat to convert into a house boat; must be sound hull and cheap; speed no object. Address Box 35 Chicago Athletic Club, Chicago. April 19

—GAS ENGINES FOR SALE—Pierce upright of 1 h. p.; Pierce horizontal of 1 h. p.; Otto of 1 h. p.; one 7 h. p. Otto; one 10 h. p. Otto, gas or gasoline; one Fairbanks, 10 h. p., gasoline; also 20 h. p. Springfield, gas or gasoline. All replaced by Backus engines, the best built. Backus Gas Engine Co., 171 Lake St., Chicago. April 26

FOR SALE—2-horse power Morris Heights Gas Engine & Power Co.'s naphtha launch; good as new; brass fittings; seat fifteen people; speed between 7 and 8 miles per hour; price $475. J. U. Karr, 165 River street, Cleveland, O. [April 5.

—FOR SALE—Scotch marine water-back boiler; 7 feet diameter, 11 feet long; dome 30x30 inches; furnace 40 inches diameter; 69 3-inch tubes, 8 feet 6 inches long. Built under government inspection and just completed. Price $2,500. F. O. B. cars Minneapolis. Address Nicollect Island Boiler Works, Minneapolis, Minn. tf

—FOR SALE—Two fine and fast steam launches in first-class condition. One of 35 feet, burns oil; one of 40 feet burns coal. Both on lakes, near Buffalo. Will be sold cheap. H. J. Smith, 695 Ellicott Square Bldg., Buffalo. April 19.

—WANTED—Light-draught tow boat for handling log barges; also two steam derrick boats and six barges for barging logs. Address Speer Box & Lumber Co., Jackson, Clarke County, Ala. April 5.

—NEW STEAMBOAT HULL FOR SALE CHEAP—Built for passenger and freight service. Suitable for great lakes. Good sea boat. Ninety-seven feet over all, 18 feet beam. Have high pressure engine, 14x14, but no boiler. Will sell as she stands, cheap for cash or will fit out complete in first-class way. Photograph if desired. Frank W. Reynolds, Canajoharie, N. Y. April 5.

—FOR SALE—Sutton marine engine 14x14 inches. A. L. Dawson & Co., 29 W. Washington St., Chicago. April 5.

—FOR SALE—Machinery from wrecked steamers St. Lawrence and H. A. Tuttle, consisting of engines, boilers, steam steering engines, steam windlasses, etc. For particulars inquire of E. G. Crosby & Co., Muskegon, Mich. tf

MARINE REVIEW

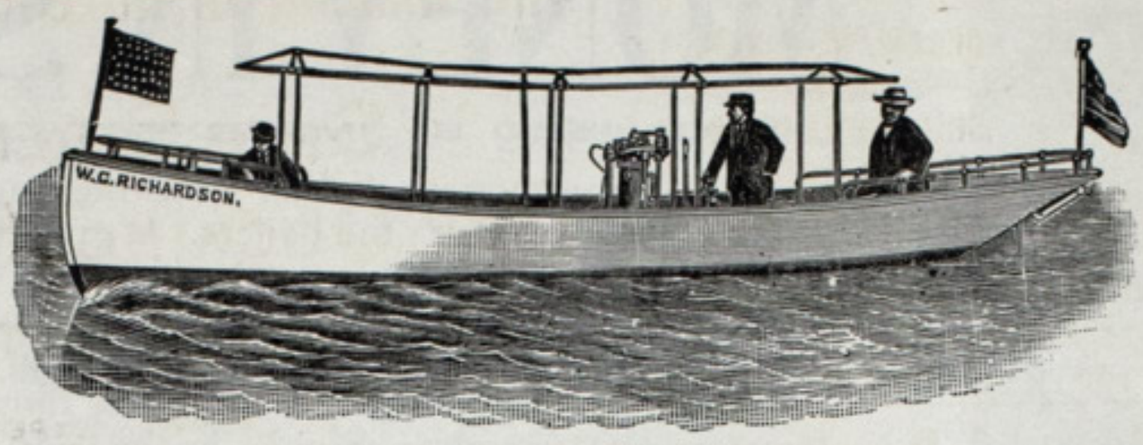
VOL. XXI. CLEVELAND, O., APRIL 5, 1900. No. 14.

The Wootters Gas Engine.

Especially adapted for launches and ferry boats. Fitted with friction clutch or reversible shaft.

These engines are giving entire satisfaction in the pleasure yacht W. C. Richardson and the delivery launch Lotta.

Prices and particulars furnished on application.

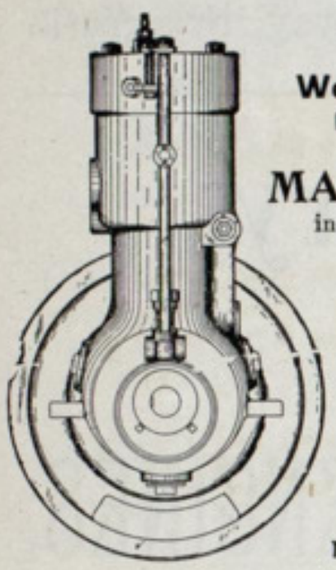


NAPHTHA LAUNCH W. C. RICHARDSON, (Engine 8 horse power—speed 8 miles an hour.)

Suitable for all purposes requiring from 1 to 200 horse-power, with the lowest possible expenditure.

Engines of the stationary type built for every purpose where a reliable and efficient power is required.

BUILT BY THE . . . . . McMYLER MFG. CO., GAS ENGINE DEPARTMENT, 180 Columbus St., CLEVELAND, O.

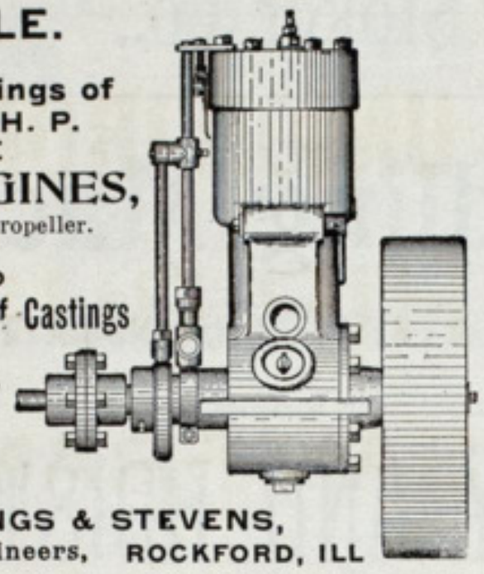


FOR SALE.

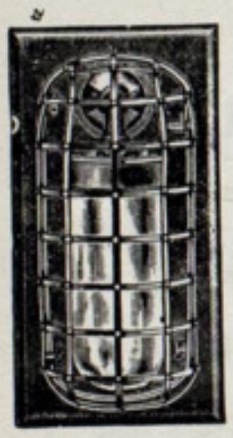
Working Drawings of
1—2½—4 & 6—H. P.
2-CYCLE
MARINE ENGINES,
including reversing propeller.

ALSO
Sample Sets of Castings
TO INTENDING MANUFACTURERS.

SIMPLEST DESIGN OF ALL!



GIDDINGS & STEVENS,
Mechanical Engineers, ROCKFORD, ILL

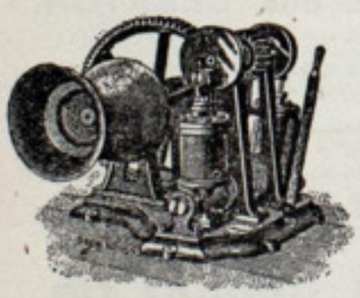


Ship Lamps

OIL AND ELECTRIC FIXTURERS
— FOR —
Steamships, Yachts, &c.
GREAT VARIETY OF DESIGNS.
Prices and Cuts on Application.

PAGE BROS. & CO.

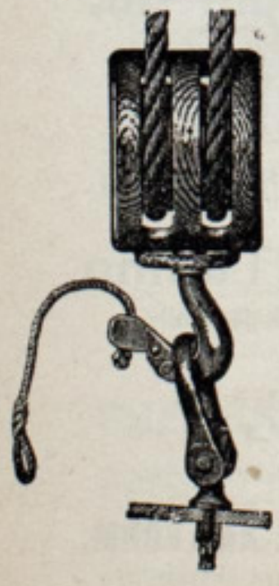
347 to 357 Cambridge St. Boston, Mass.



Hoisting Engines.

We build them in all sizes from new and improved designs. Every engine thoroughly tested before leaving our shop, and guaranteed to be satisfactory in every case. When in want of a hoist for marine work, dock work, mining, or any other purpose, kindly permit us to name you prices. We know we can please you.

Marine Iron Co. BAY CITY, MICH.



Standard Automatic Releasing Device.

The falls are so rove that both ends of the boat detach, irrespective of which end strikes the water first.

Will release a boat immediately in the roughest sea or under speed and can be hooked on without delay or injury to the hands of men hooking it on.

Standard Automatic Releasing Hook Co
New Cheesebrough Building,
17 State Street, New York, N. Y.

ESTABLISHED 1884. INCORPORATED 1894

Morse Iron Works and Dry Dock Co.

ENGINEERS, MACHINISTS
AND BOILER MAKERS.
Excellent Facilities for DOCKING and REPAIRING VESSELS.
CABLE ADDRESS: PYROSISON, N. Y.
Foot 26th and 27th St., BROOKLYN, N. Y.

TOWNSEND & DOWNEY SHIP BUILDING & REPAIR CO.

SHIP BUILDERS AND OUTFITTERS,
DRY DOCKING AND REPAIRING.
Works at Shooters Island, New York City.
New York Office, 22 & 23 D., Produce Exchange. Telephone, 500 Broad.

NEVERSINK CORK JACKET AND LIFE BELT.

Warranted 24 pounds. Buoyancy and full Weight of Cork, as required by U. S. Inspectors.

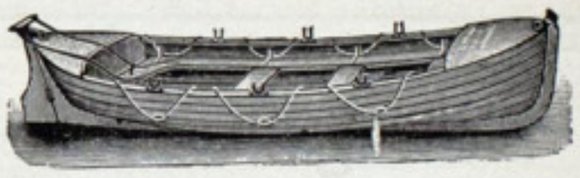
Consolidated Cork Life Preservers. Ring Buoys and Fenders.

SAFEST, CHEAPEST.

Approved and adopted by U. S. Board of Supervising Inspectors. Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Awarded four Medals by World's Columbian Exposition.

Send for Illustrated Catalogue.

Metallic and Wooden Life Boats.



Metallic Life Rafts. Marine Drags.

Manufacturers of Woolsey's Patent Life Buoy—the lightest, cheapest and most compact Life Raft known.

DAVID KAHNWEILER'S SONS
437 Pearl Street, NEW YORK CITY.

STAYBOLTS, Both Hollow and Solid,

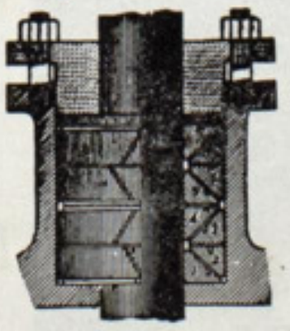
OF THE BEST QUALITY OF
STEEL or CHARCOAL IRON.

FALLS HOLLOW STAYBOLT CO. MANF'RS OF SAFETY STAYBOLT IRON.

Guaranteed to pass U. S. Government Specifications and Inspection.
Write for Samples and Prices.

FALLS HOLLOW STAYBOLT CO., CUYAHOGA FALLS, OHIO.

KATZENSTEIN'S Self-Acting METAL PACKING,



For PISTON RODS, VALVE STEMS, etc., of every description, for Steam Engines, Pumps, etc., etc.

Adopted and in use by the principal Iron Works and Steamship Companies, within the last twelve years, in this and foreign countries.

FLEXIBLE TUBULAR METALLIC PACKING, for slip-joints on Steam Pipes, and for Hydraulic Pressure; also METAL GASKETS for all kinds of flanges and joints.

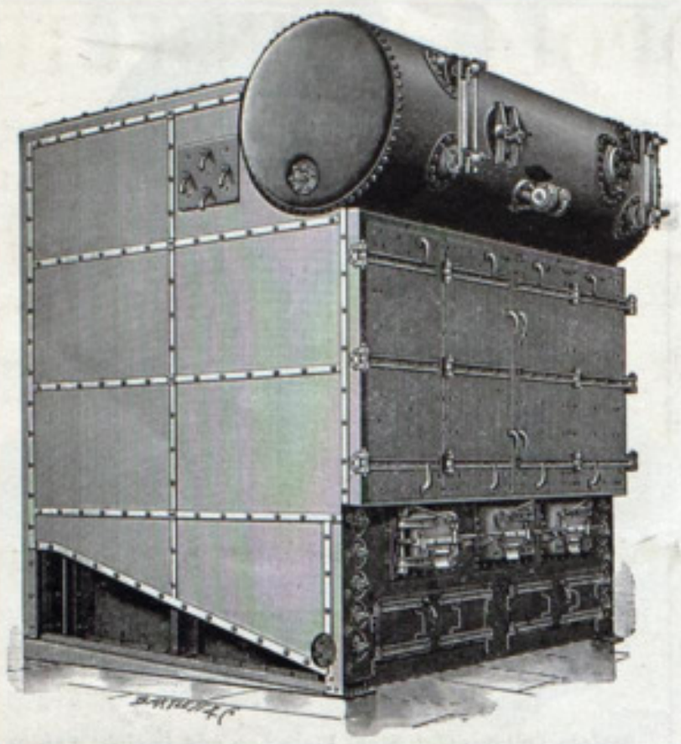
DOUBLE-ACTING BALANCED WATER-TIGHT BULKHEAD DOORS for Steamers. Also Agents for the McColl Cumming PATENT LIQUID RUDDER BRAKE. For full particulars and reference, address:

L. KATZENSTEIN & CO.,
General Machinists, Brass Finishers, Engineers' Supplies,
357 West St., New York.

FARRAR & TREFTS,

Propeller, Yacht and Tug Wheels.
Marine and Stationary Engines & Boilers
Repairing Promptly Attended to.
Drilling Boilers and Engines a Specialty

64 to 66 Perry Street, BUFFALO, N. Y.



The Babcock & Wilcox

FORGED STEEL WATER TUBE BOILERS

Are being installed in the **Four Largest Carriers of the Great Lakes,** now building for The American Steamship Co. Boilers under construction for Five 8000-ton Ships building for The Pittsburgh Steamship Co.

Ten Large Vessels of the Pacific Coast,
Floating Government Dry Dock, Algiers,
Steam Dredge Texas City . . . . . } **to be fitted with this Boiler.**

BUILDING FOR U. S. NAVY: MONITOR WYOMING; CRUISERS CINCINNATI AND RALEIGH; NEW PROTECTED CRUISERS TACOMA GALVESTON AND CHATTANOOGA

THE BABCOCK & WILCOX CO.,

29 Cortlandt Street, NEW YORK.

The Roberts Boiler Co.

HAS BUILT OVER 1000 BOILERS TO DATE for

Launches, Yachts, Passenger and Freight Steamers, Dredges, Tugs, Stern-Wheelers, Canalers; also for Navy Department, War Department, Treasury Department, Light-House Board and Revenue Cutter Service; also for N. Y. Dock Department and U. S. Supervisor, Harbor of N. Y.

SAFETY AND ECONOMY.

Never killed a man or had a serious accident. $250,000 capital. Works covering 29,000 square feet of ground. Never had a boiler returned on account of dissatisfaction. Every Boiler Warranted. All material made specially for our use. All boilers tested at 500 pounds hydrostatic pressure and 250 pounds of steam before shipping. Workmanship strictly first-class. All joints screwed and reliable. No expanded joints. State your requirements and we will furnish specifications. Correspondence solicited.

THE ROBERTS SAFETY WATER TUBE BOILER CO.,

39 and 41 Cortlandt Street, New York City.

Works, Red Bank, N. J.

ALL THE NAVIES OF THE LEADING GOVERNMENTS OF THE WORLD USE

The Niclausse Water Tube Boiler,

ADOPTED BY THE NAVIES OF

UNITED STATES,	RUSSIA,	SPAIN,
ENGLAND,	ITALY,	Argentine Republic,
FRANCE,	GERMANY,	CHILI.

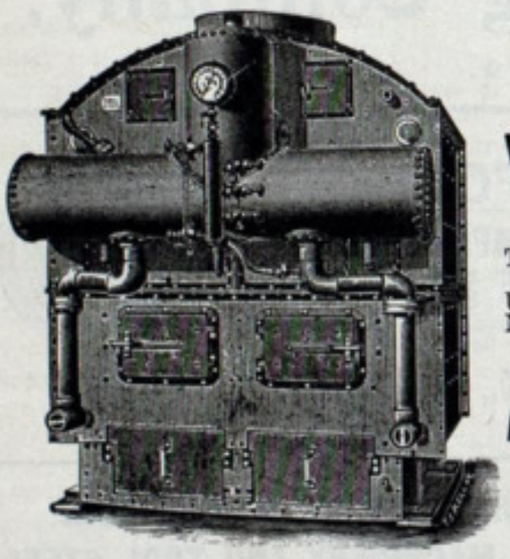
We have now in course of construction at our Works 60,000 H. P. Niclausse Boilers for the following war vessels:

U. S. Monitor CONNECTICUT, } Building at the Ship Yard of the Bath Iron Works, Bath, Me.

U. S. Battleship MAINE,
Russian Battleship RETVIZAN,
Russian Cruiser VARIAG, } Building at Wm. Cramp & Sons Ship Yards, Philadelphia.

THE STIRLING COMPANY,

Write for Descriptive Matter. **General Offices Pullman Building, Chicago, Ill.**



ALMY'S PATENT

SECTIONAL

Water Tube Boilers.

NOW USED IN

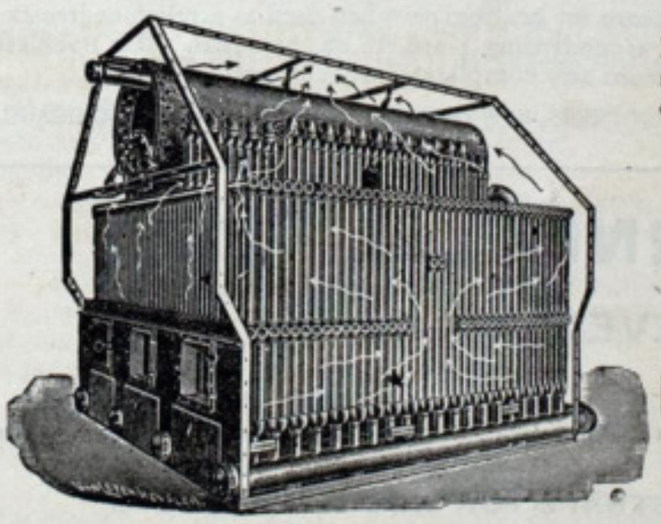
Thirty Passenger Boats and 100 Steam Yachts ranging from 50 to 250 feet in length,
U. S. Torpedo Boat "Stiletto."
Numerous Small Launches and Stationary Boilers also giving most excellent results.

ALMY WATER-TUBE BOILER CO.,

178-184 Allens Avenue,
near Rhodes St.

PROVIDENCE, R. I.

THE "TAYLOR" YACHT BOILER



Has held the record three seasons on the fastest yacht on the great lakes.

Guaranteed against Rupture of Tubes.

Will not Prime in the Roughest Sea.

MANUFACTURED BY

Detroit Screw Works,

FOOT OF REOPELLE ST.,

DETROIT, MICH., U. S. A.

The Watson Radial W. T. Boiler.

REPORT OF PERFORMANCE OF TEN H. P. COMPOUND.

COPY OF LETTER FROM CAPT. NEWHALL.

Washington.

"I suppose you think it is nearly time I reported on the performance of the little boiler you sent me last March. At first I had trouble keeping steam, but soon found that it was the fault of the fireman. The boiler works very satisfactorily indeed, and is giving great results. Steamboat men about here are much interested in its performance. I shall want a much larger boiler soon, and will give details later."

This little boiler is only 3 ft. 9 in. high, by 30 in. base, has only 42 sq. ft. h.-s., and 1.65 sq. ft. g.-s., but it drives a 3x5x5-inch condensing compound, 250 r.-p.-m., with air and feed pump on natural draft. Weight of boiler, 600 pounds. Working pressure, 200 pounds.

I build boilers up to 150 h. p.

EGBERT P. WATSON, Mfr.,

MADISON AVE. SHOPS, ELIZABETH, N. J.

THOS. DREIN & SON

TATNALL AND RAILROAD STS. WILMINGTON, DEL.

Builders of Metallic Life Boats and Rafts, Yachts and Pleasure Boats.

Life Preservers.

Outfit for Lake Steamers a Specialty.

Telephone Call 340-B, Greenpoint.

LANE & DeGROOT,

METALLIC LIFE BOATS,

(Formerly Raymond's)

Metallic Life Rafts, Cork Life Preservers, Etc., approved by the U. S. Supervising Inspectors Also Wood Boats of Every Description. Repairing of every kind promptly attended to.

70 and 72 Kent St., BROOKLYN, NEW YORK.